

JPRS 79713

23 December 1981

China Report

SCIENCE AND TECHNOLOGY

No. 141



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APPLIED SCIENCES

BRIEFS

SYNCHROTRON RADIOLOGICAL UNIT--Hefei, 5 Nov (XINHUA)--The design and trial-production of China's first synchrotron radiological unit for accelerating electron and obtaining luminous emission have been successfully completed after 3 years of hard work. The project was done at the China University of Science and Technology with assistance from the plasma physics department of the Chinese Academy of Sciences, Zhejiang University and the Solid State Physics Research Institute of the Chinese Academy of Sciences. An evaluation meeting was recently held in Hefei by representatives from 30 units with satisfactory results. [Beijing XINHUA Domestic Service in Chinese 0742 GMT 5 Nov 81 OW]

AVAILABILITY OF PATENT DOCUMENTS--Beijing, 3 Nov (XINHUA)--Nearly 8 million patent documents imported from 15 countries and two international organizations are now open to Chinese readers, according to the documents library of the patent bureau of China. The documents are from Australia, Austria, Britain, Canada, Czechoslovakia, Democratic Republic of Germany, Federal Republic of Germany, France, Japan, Poland, Romania, Sweden, Switzerland, the U.S.A. and the U.S.S.R. as well as from the European patent office and patent cooperation treaty. China began to import them in 1965. In recent years, China has purchased a yearly average of more than 600,000 patent documents. According to the patent bureau, the opening of these documents will help more people learn current trends of the world's technology in order to promote China's science and technology. [Text] [Beijing XINHUA in English 1229 GMT 3 Nov 81 OW]

CSO: 4020/49

LIFE SCIENCES

BRIEFS

SHANGHAI SYNTHETIC INSULIN RESEARCH--Beijing, 10 Nov (XINHUA)--Scientists have synthesized for the first time in China peptide C of human pro-insulin, an inorganic active material that exists in human blood serum, according to the Shanghai Institute of Biological Chemistry under the Chinese Academy of Sciences. The institute and the general hospital of the Chinese navy in Beijing have, since 1979, also developed a radioactive immunological technique for assaying the activity of peptide C in the body. According to a spokesman for the Shanghai Institute, these achievements are important to research of carbohydrate metabolism and the function of insulin, which is a biologically active protein that exists in the pancreas of the mammal. Since last year, 7 hospitals and medical research institutes in Shanghai and Beijing have used the method on 1,000 persons. The results are accurate, according to the general hospital of the navy. [OW111454 Beijing XINHUA in English 0910 GMT 10 Nov 81]

MEETING ON SCHIZOPHRENIA--Nanjing, 26 Nov (XINHUA)--China's first academic conference on schizophrenia, held by the Chinese Medical Association, recently met in the city of Suzhou, Jiangsu Province. Participating in the seven-day conference were delegates from across the nation except Taiwan and Tibet. Three hundreds papers presented at the conference indicated that advances have been made in recent years in pathogeny, incidence mechanism, psychology of schizophrenia and its treatment. A U.S. psychiatry delegation also attended. The U.S. delegates talked with their Chinese colleagues, and reported on young people's psychosis, children's psychosis and psychosis and the law. [Text] [OW261404 Beijing XINHUA in English 1238 GMT 26 Nov 81]

CSO: 4020/47

SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

PHYSICIST INFORMS NPC PANEL OF SCIENTIFIC GAINS

OW041903 Beijing XINHUA in English 1838 GMT 4 Dec 81

[Text] Beijing, December (XINHUA)--Noted Chinese physicist Qian Sanqiang said today that Chinese scientists are capable of solving difficult scientific problems once they are organized as proposed in Premier Zhao Ziyang's report to the National People's Congress.

Speaking at a panel meeting held by the N.P.C. deputies from Tianjin, the vice-president of the Chinese Academy of Sciences said that Chinese scientists are intelligent. He chastised the idea that the Chinese are inferior in everything.

Even foreign scientists disagreed to that kind of thinking, he said.

"During my visits to the United States, France and other countries in recent years," he said, "whenever I said that I wanted to learn from foreign scientists, friends in these countries would reply: China might be comparatively backward in some branches of science, but it is fairly advanced or even well ahead in such branches as atomic science, guided missile and satellite sciences and in the synthesis of insulin.

"Of course," Qian Sanqiang said, "we must admit that our science and technology as a whole are relatively backward, but a fact is a fact, we are fairly advanced in the world in some branches of science and technology. There is no reason for us to belittle our capabilities."

Explaining how to develop science more quickly, Qian Sanqiang said that the most important thing was to organize the scientists to tackle scientific problems by giving full play to the superiority of the socialist system under the leadership of the communist party and government.

He cited the development of China's atomic science to illustrate his point. There were only a few nuclear scientists equipped with poor instruments when atomic research was first started in the early post-liberation years, he said.

"We had many difficulties owing to the blockade imposed by imperialism and social-imperialism. However, on the instruction of Chairman Mao Zedong,

the Central Committee of the party and the State Council organized government departments and more than 20 institutes under the Chinese Academy of Sciences to coordinate in research work. It took us only a few years to solve the problems in experimental physics, detecting technology, theoretical physics, radioactive-chemistry, metallurgy and chemical engineering and we succeeded in exploding China's first atomic bomb on October 16, 1964. Two years and eight months later, we succeeded in exploding our first hydrogen bomb. But for these concerted efforts, such a big scientific and technological achievement in so short a time could not have been done."

These experiments were received with approbation by foreign scientists, he said. Some foreign scientists were sceptical about China's achievement in the synthesis of insulin. But when it was shown to them, they began to ask how China had managed to have it done. They were told that it was the result of the long term cooperation among 36 scientists from three scientific and educational institutions. They said that this could hardly be done in their countries.

"This once more demonstrates the superiority of our socialist system over the capitalist system," Qian Sanqiang said. "Once we get organized in the development of science and technology, our strength is tremendous."

He said that China now had many more scientists and technicians than in the fifties and their competence was much higher. "Premier Zhao Ziyang," he said, "has summed up the experience in scientific research and called upon us to get organized to tackle important scientific and technological problems. I am entirely for it," he said.

"Given the elimination of barriers among the departments and localities, the strengthening of leadership and the close cooperation among scientists, greater successes will surely be achieved in the tackling of key problems in science and technology, thus contributing to the modernization of our country," he said.

CSO: 4020/48

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Ni Shuhong [0242 2579 3163], Department of Thermodynamics (85)

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The Formation and Some Properties of Ship Waves.....Shen Guoguang [3088 0948 0342], Tianjin University	(6)
Introduction to Thermo-physicochemical Properties of High-temperature Gases.....Zhong Jiakang [6945 1367 1660], Zhejiang University	(13)
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Numerical Analysis of Torsion with Restraint Twist for Strengthening Thin-wall Element.....Cai Linsheng [5591 7792 4563], Taiyuan Heavy Machinery Design Institute (48)

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CSO: 4008/35

Armaments

AUTHOR: SUN Gengchen [1327 1649 6591]
et al.

ORG: None

TITLE: "A Simplified Model of the Penetration of the Long-rod Penetrator against the Plates with Semi-infinite Thickness at Normal Angle"

SOURCE: Beijing BINGGONG XUEBAO [ACTA ARMAMENTARII] in Chinese No 4, Nov 81
pp 1-8

TEXT OF ENGLISH ABSTRACT: In this paper, an analysis is made of the main phenomena and the whole process of the normal impact by a long rod penetrator. A simplified calculating model of the penetration at a normal angle is established to illustrate the influence of the breakage of the rod as well as the material properties of the rod and plate on the penetration process and to quantitatively describe the regularity of variations in the velocity and length of the rod and depth of the penetration during the penetration against the plate with semi-infinite thickness. The velocity range is from 900 m/s to 1600 m/s. The calculations relatively conform to the testing results.

AUTHOR: SHI Jusheng [2457 5112 3932]

ORG: None

TITLE: "Engineering Calculation for the Sensitivity of the Autodyne"

SOURCE: Beijing BINGGONG XUEBAO [ACTA ARMAMENTARII] in Chinese No 4, Nov 81
pp 23-31

TEXT OF ENGLISH ABSTRACT: Principles of the operation of the autodyne used in Doppler radio proximity fuses are analyzed in the autodyne as an LC oscillator. Based on the balance conditions of the LC oscillator, a formula for calculating the sensitivity of the autodyne is derived, applicable to electronic tubes as well as transistor autodyne devices. In this formula, not only the nonlinearity of transconductance of the devices, but also the nonlinearity of output and input characteristics are taken into account. In addition, the classification of operating state of the devices and their effect on the sensitivity of the autodyne are also studied.

AUTHOR: SUN Lizhi [1327 4539 1807]
QIAN Juxing [6929 4395 2502]

ORG: None

TITLE: "Experimental Studies of Blunt Shells Equipped with Nose Spike in a Supersonic Wind Tunnel"

SOURCE: Beijing BINGGONG XUEBAO [ACTA ARMAMENTARII] in Chinese No 4, Nov 81
pp 53-63

TEXT OF ENGLISH ABSTRACT: An investigation has been made of the flow over a series of blunt shell models equipped with nose spike and cylindrical afterbody at Mach numbers of 2.0 and 2.5, and experimental data and Shlieren photographs of typical flow behaviors are obtained. The processes of flow separation of spiked blunt bodies and the factors influencing spike tip separation or retarded separation are discussed, and steps to prevent retarded separation are proposed. The mechanism of flight stability of spiked blunt bodies and some design problems are discussed.

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CSO: 4009/145

AUTHOR: ZHOU Zhonglin [0719 0022 2651]

ORG: Automobile Engine Plant, Shijiazhuang City

TITLE: "Cause of Oil Leak in the Front Oil Seal of JiefangCA10B Engine"

SOURCE: Changchun QICHE JISHU [AUTOMOBILE TECHNOLOGY] in Chinese No 10, 25 Oct 81 pp 46-47

ABSTRACT: Oil leak in the front oil seal of JiefangCA-10B automobile engine is a common problem and one of the following is generally the cause of it: (1) The timing gear and the cylinder are not exactly aligned so that a space occurs during deceleration; (2) The axle hole on the crankshaft is not exactly positioned; (3) Poor quality oil seal; (4) The oil seal is bent or not properly installed; (5) The oil pass from the timing gear cover is either too small or obstructed to cause too much lubricant to be accumulated in the timing gear cover. When one or more of these problems exist, oil will be observed on the road especially there will be oil leaking out when the car is driven downhill. The process of analyzing the cause of the oil leak problem and measures taken to correct the condition are explained.

AUTHOR: None

ORG: None

TITLE: "Front and Inside Front Covers and Back and Inside Back Covers Explained"

SOURCE: Changchun QICHE JISHU [AUTOMOBILE TECHNOLOGY] in Chinese No 10, 25 Oct 81 p 58, front, inside front, back, inside back covers

ABSTRACT: Advertisements are used for covers in this issue of the journal: (1) The front cover, explained on p 58, introduces 4 products of the Fuzhou Municipal Automobile Repair and Assembly Plant including the Fuzhou-FZ-211 jeep, the Fuzhou-FZ-131 light diesel truck, the Fuzhou-FZ-130 light gasoline-powered truck, and the Fuzhou-FZ-621 tour bus (13-18 passenger size) (2) The inside front cover introduces 10 tractor parts manufactured by Sheyang County Tractor Repair and Manufacture Plant of Jiangsu Province; (3) Several products, including oil seals, gaskets, etc. made by Changchun Municipal Automobile Parts Plant No 1 are introduced on the inside back cover. (4) The back cover is a full page advertisement introducing products of the Xiangyi Component and Instrument Plant of the State's Bureau of Instrument and Meter Industry. The plant is located in Hongjiang City of Hunan Province.

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CSO: 4009/137

AUTHOR: MA Peisheng [7456 3099 3937]
JIANG Biyun [3068 4310 0061]
ZHANG Jianhou [1728 1696 0186]

ORG: All of the Department of Chemical Engineering, Tianjin University

TITLE: "Critical Assessment of Viscosity and Its Correlation with Temperature for Gaseous Substances under Normal Pressure"

SOURCE: Beijing HUAGONG XUEBAO [JOURNAL OF CHEMICAL INDUSTRY AND ENGINEERING] in Chinese No 3, 1981 pp 193-205

TEXT OF ENGLISH ABSTRACT: The viscosity data of 61 gaseous substances under normal pressure are critically assessed. The data collected were published for 50 of the substances from 1967 to 1979, and for the others from 1960 to 1966. The mathematical expressions used in the literature for correlating viscosity data of gaseous substances with temperature are reviewed, systematized and selected to correlate the data assessed. The coefficients of the selected correlations are determined by the least squares method with a digital computer. The viscosity values calculated by these correlations are then compared with the experimental measurements. For the four-coefficient correlations, $\eta = A_0 + A_1T + A_2T^2 + A_3T^3$ (I) and $\ln\eta = A_0 + B_0\ln T + B_1/T + B_2/T^2$ (II), the overall percent deviations are 0.160 and 0.157 respectively. Equation (I) is recommended for simplicity of calculation.

[Continuation of HUAGONG XUEBAO No 3, 1981 pp 193-205]

The two-coefficient correlations, $\eta = KT^{3/2}/(C+T)$ (III), $\eta = A_0 + A_1T$ (IV) and $\eta = aT^m$ (V) have nearly the same accuracy of estimating viscosity values. Equation (IV) is simple for use and equation (III) can correlate data of a wider temperature range with an overall percent deviation of 0.460.

AUTHOR: SHEN Ziqiu [3088 5261 3061]
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DING Jie [0002 3381]

ORG: All of Dalian Institute of Technology

TITLE: "Interphase Mass Transfer (II)--The Modified Surface Film Renewal Model for the Liquid Phase Mass Transfer Accompanied by a First-order Irreversible Reaction"

SOURCE: Beijing HUAGONG XUEBAO [JOURNAL OF CHEMICAL INDUSTRY AND ENGINEERING] in Chinese No 3, 1981 pp 206-216

TEXT OF ENGLISH ABSTRACT: Based on the modified surface film renewal model, a mathematical model for the liquid phase mass transfer accompanied by a first-order irreversible chemical reaction is derived, i.e.,

$$k_L \sqrt{\frac{\theta}{D}} = (1 + S\theta) \left\{ \sqrt{k_1 \theta + S\theta} \operatorname{erf} \sqrt{k_1 \theta + S\theta} + \frac{e^{-(k_1 \theta + S\theta)}}{\sqrt{\pi}} \right\}$$

A discussion of the "Chemical Method" used for the determination of interfacial area is presented. In applying this model, $k_1 \theta = 2$ is being taken as the condition for the absorption process approaching a steady state, and the concept for the time

[Continuation of HUAGONG XUEBAO No 3, 1981 pp 206-216]

of reaction penetrating through $\theta\kappa$ is proposed. If the depth where the relative solute concentration being degraded to 0.01 is taken as the thickness of the reaction zone $\delta\kappa$, an expression for calculating $\delta\kappa$ is derived. In addition, a process for calculating the interfacial area and the frequencies of surface renewal by this model is also suggested.

Based on the procedure proposed, some data taken from the literature are treated, and the results are compared with those from Danckwert's model.

AUTHOR: BAI Naibin [4101 0035 1755]

ORG: Shanghai Institute of Metallurgy, Chinese Academy of Sciences

TITLE: "Evaluation of the Energy of Activation of Chemisorption for H₂ and O₂ on Transition d-Metals"

SOURCE: Beijing HUAGONG XUEBAO [JOURNAL OF CHEMICAL INDUSTRY AND ENGINEERING] in Chinese No 3, 1981 pp 217-223

TEXT OF ENGLISH ABSTRACT: In this paper, an empirical method based on two atom-parameter equations is developed:

$$-\Delta H_{\text{H}_2} = -31.11 \frac{z}{r_{\text{cov}}} - 180 \left(\frac{1 - I_0}{I_0} \right) + 208.9$$

$$-\Delta H_{\text{O}_2} = -4.54 \frac{z}{r_{\text{cov}}} - 180 \left(\frac{1 - I_0}{I_0} \right) + 212$$

The initial heats of chemisorption for H₂ and O₂ on transition d-metals are successfully evaluated. Furthermore, the energy of activation of surface chemisorption of oxygen with transition d-metal surfaces are empirically calculated using a

[Continuation of HUAGONG XUEBAO No 3, 1981 pp 217-223]

bond energy bond order (BEBO) approach. The agreement of the calculated results with the experimental data is satisfactory. The metals are then classified approximately into three groups, A, B and C, in which the chemisorption properties are different from each other.

AUTHOR: HE Daxin [0149 6671 9515]
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TITLE: "A Study of the Characteristics of Cup-jet Absorber"

SOURCE: Beijing HUAGONG XUEBAO [JOURNAL OF CHEMICAL INDUSTRY AND ENGINEERING]
in Chinese No 3, 1981 pp 224-240

TEXT OF ENGLISH ABSTRACT: A cup-jet absorber is one of the high velocity co-current equipments of mass transfer. Research on this equipment in related literature was only restricted to the operation conditions below the liquid-gas ratio $m = 8 \text{ l/m}^3$, while works on the liquid-gas ratio $m = 10 \text{ l/m}^3$ have not yet been found in the periodicals. The present paper deals with the study of the following two subjects: (1) Observation of the flow patterns in a cup-jet absorber; (2) Approach to the correlated method of the pressure drop and the mass transfer data of the cup-jet absorber under the high liquid-gas ratio.

The experiments were undertaken on air-ammonia-water system under the conditions of liquid-gas ratio $m = 4$ to 30 l/m^3 and gas velocity $w_g = 10$ to 50 m/s at the bottom of the cup. We arrived at the following conclusions:

(1) The operation regions of a cup-jet absorber were divided into three different

[Continuation of HUAGONG XUEBAO No 3, 1981 pp 224-240]

flow patterns. The first state is known as a pulsation state, the second as a homogeneous and continuous state, and the third as an extreme turbulent state.

(2) We have presented the following empirical equations for a cup-jet absorber.

In a dry column, if $Re \leq 3.1 \times 10^4$, the pressure drop data for a cup-jet absorber are correlated

$$La = 8.95 \times 10^{-1} Re^{0.95}$$

and if $Re > 3.14 \times 10^4$,

$$La = 1.168 \times 10^{-1} Re$$

where La is the Lagrangian number and Re is the Reynolds number.

In a wetted-cup column with the dimensionless group $\frac{w_g \mu_c}{d_c^2 \gamma_c} > 0.06$ and

when $m \left(\frac{w_g \mu_c}{d_c^2 \gamma_c} \right)^{1/3} < 1$, the flow state is of the second pattern,

$$La = 4.83 \times 10^{-1} m^{0.402} \left(\frac{w_g \mu_c}{d_c^2 \gamma_c} \right)^{1.09}$$

when $m \left(\frac{w_g \mu_c}{d_c^2 \gamma_c} \right)^{1/3} > 1$, that is the third state,

$$La = 7.49 \times 10^{-1} m^{1.09} \left(\frac{w_g \mu_c}{d_c^2 \gamma_c} \right)^{1.09}$$

[Continuation of HUAGONG XUEBAO No 3, 1981 pp 224-240]

where w_G --the gas velocity at the bottom of the cup, m/s;

γ_G --the gas density, kg/m³;

μ_G --the gas viscosity, kg-s/m²;

d_0 --the diameter at the bottom of the cup, m.

In addition, we have also found that the mass transfer data can be correlated by the following empirical equation:

$$K_{yg} = 188 w_G^{1.27} \mu_G^{-0.61}$$

$$N_{OG} = 1.03 w_G^{0.9} \mu_G^{-0.6}$$

where, K_{yg} --the overall gas mass transfer coefficient for a cup-jet in kg-mols/h-m³ (unit molar concentration difference);

N_{OG} --the number of overall gas transfer units for a cup-jet.

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TITLE: "Selection of Internals for Fluidized Beds"

SOURCE: Beijing HUAGONG XUEBAO [JOURNAL OF CHEMICAL INDUSTRY AND ENGINEERING] in Chinese No 3, 1981 pp 241-245

TEXT OF ENGLISH ABSTRACT: Following the selection of internals for a 109 mm diameter fluidized bed, four kinds of internals were evaluated for a 360 mm diameter fluidized bed on the basis of the oxidation of o-xylene to phthalic anhydride. The yield of phthalic anhydride was chosen as the test index. The results obtained were essentially the same as those for the previous smaller bed, i.e., the lower baffles were the best, the perforated plate slightly inferior, and the vertical tubes the

[Continuation of HUAGONG XUEBAO No 3, 1981 pp 241-245]

least ideal. But, when vertical tubes were used in combination with horizontal plates, equivalent effects were noted with plate-type baffles having smaller spacings. Regression equations showed that fluidized beds equipped with vertical tubes were less sensitive to temperature and gas velocity, implying that the flow patterns were not the same as those for horizontal internals.

AUTHOR: SHI Yanfu [4258 3508 4395]

ORG: Chemical Engineering Department, Chengdu University of Science and Technology

TITLE: "The Calculation of the Residence Time Distribution for Reactors with Circulating Systems"

SOURCE: Beijing HUAGONG XUEBAO [JOURNAL OF CHEMICAL INDUSTRY AND ENGINEERING] in Chinese No 3, 1981 pp 246-259

TEXT OF ENGLISH ABSTRACT: The residence time distribution for reactors with circulating systems is analyzed. Equations for calculation of this residence time distribution are derived. By means of the computer, the data of the residence time distribution at various cycle ratios have been obtained. Under some conditions the simplified methods for calculation of the residence time distribution for reactors with circulating systems are suggested.

AUTHOR: XU Zhong [1776 1813]

ORG: Department of Power Engineering, Xi'an Jiaotong University

TITLE: "Compressibility Factors of Gas Mixtures Containing Hydrogen"

SOURCE: Beijing HUAGONG XUEBAO [JOURNAL OF CHEMICAL INDUSTRY AND ENGINEERING]
in Chinese No 3, 1981 pp 260-267

TEXT OF ENGLISH ABSTRACT: The Lee-Kesler equation has been extended to gas mixtures containing hydrogen when the modified Kay's rule proposed in this paper is used to determine pseudocritical constants of the mixtures. The modified Kay's rule is

$$P_{cm} = A\psi x_{H_2} P_{CH_4} + \sum_{i=1}^{n-1} x_i P_{ci}$$
$$T_{cm} = \theta x_{H_2} T_{CH_4} + \sum_{i=1}^{n-1} x_i T_{ci}$$

with $A = 1.15$, where ψ and θ are the shape factors.

By using the modified Kay's rule, the Lee-Kesler equation is applied to calculate the compressibility factors of three systems, which are nitrogen-hydrogen, hydrogen-methane-nitrogen, hydrogen-nitrogen-carbon dioxide-carbon monoxide-methane, all

[Continuation of HUAGONG XUEBAO No 3, 1981 pp 260-267]

containing hydrogen, over a wide range of pressure and temperature. Computation of the compressibility factors is carried out in the following procedure:

1. for hydrogen, $\theta_0 = 1.45$, $\phi_0 = 0.633$,
2. calculation of $\frac{B}{\phi_0 V_c}$ and $(\frac{B}{V_c})_{H_2}$ from equations 6 and 7,
3. calculation of θ_T and ϕ_T from equations 4 and 5,
4. calculation of θ and ψ from equations 1 and 8,
5. calculation of P_{cm} and T_{cm} from equation 9,
6. calculation of the compressibility factors from equation 10.

The results are compared with experimental data presented in the literature. Agreement between calculated and experimental values is excellent for all three systems.

In the current work, the modified Kay's rule proposed here is further compared with the use of GCP's rule for finding pseudocritical constants. A comparison is made with the same systems. The results obviously indicate that the modified Kay's rule proposed here is more accurate than GCP's rule.

AUTHOR: LIU Guanghui [0491 0342 2585]
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ORG: Both of the Southwest Research Institute of Chemical Industry

TITLE: "Analysis of Organic Sulfur Compounds in Natural Gas"

SOURCE: Beijing HUAGONG XUEBAO [JOURNAL OF CHEMICAL INDUSTRY AND ENGINEERING]
in Chinese No 3, 1981 pp 268-278

TEXT OF ENGLISH ABSTRACT: A procedure for qualitative and quantitative analysis of organic sulfur compounds in natural gas has been established. Chromatographic methods and selective chemical reactions have been used to determine the boiling points and structures of the sulfur compounds. Relative retentions of 12 S-compounds on 4 different liquid phases were given. Experiments on four compounds containing different S-groups indicate that within a certain concentration range, the responses of FPD as expressed by $h^{1/2} \cdot w$ are independent of the nature of the S-group. Thus, a single calibration curve can be used to determine all S-compounds. Compared with other methods, satisfactory results of qualitative and quantitative analysis of three representative natural gases in Sichuan gas fields have been obtained.

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TITLE: "Angle Factor for Radiation on a Bank of Oval Tubes in Staggered Arrangement"

SOURCE: Beijing HUAGONG XUEBAO [JOURNAL OF CHEMICAL INDUSTRY AND ENGINEERING]
in Chinese No 3, 1981 pp 279-289

TEXT OF ENGLISH ABSTRACT: The angle factor for radiation on a tube bank is an important quantity in industrial furnace design. In the past years, the graphical representation was frequently used. In this paper, the formulas calculating the angle factors for radiation on a bank of oval tubes are derived. These formulas are usable for industrial furnace design. The primary results are as follows:

Single bank of oval tubes: The local angle factor at any given point A is:
Single-side radiation,

$$F_A = 0, \quad \theta \leq -\theta_c$$

$$F_A = \frac{1}{2} \left[1 + \sin \left(\angle PAE + \angle EAG - \frac{\pi}{2} \right) \right], \quad \theta > -\theta_c$$

Double-side radiation,

$$F_{A,n}(K_1, K_2, \theta) = F_A(K_1, K_2, \theta) + F_A(K_1, K_2, -\theta)$$

[Continuation of HUAGONG XUEBAO No 3, 1981 pp 279-289]

where $\angle PAE$ and $\angle EAG$ can be calculated from the given equations.

Double bank of oval tubes: The local angle factor at any given point is:
Single-side radiation (the bank which is far away from the radiation side),

$$F'_{s1} = \sum_{N=1}^N F_{s1} \sim \sum_{N=1}^N F_{s1}$$

$$F_{s1} = 0, \quad \theta < \theta_{N1}$$

$$F_{s1} = \frac{1}{2} \left[1 - \sin \left(\frac{\pi}{2} - \frac{N}{|N|} \angle P_{N1}AE - \frac{N}{|N|} \angle GAE \right) \right]$$

$$\theta_{N1} < \theta \leq \theta_{N1}$$

$$F_{s1} = -\frac{1}{2} \left[\sin \left(\frac{\pi}{2} - \angle GAE - \frac{N}{|N|} \angle P_{N1}AE \right) \right]$$

$$\sin \left(\frac{\pi}{2} - \angle GAE - \frac{N}{|N|} \angle P_{N1}AE \right)$$

$$\theta_{N1} = \theta - \frac{\pi}{2}$$

[Continuation of HUAGONG XUEBAO No 3, 1981 pp 279-289]

Double-side radiation,

$$F_{s,p}(K_1, K_2, K_3, \theta) = F_s(K_1, K_2, \theta) + F'_s(K_1, K_2, K_3, -\theta)$$

where $\angle GAE$, $\angle P_{N1}AE$ and $\angle P_{N2}AE$ can be calculated from the given equations.

Some calculated results of the angle factor for radiation to a single bank of oval tubes are given in a table as an illustrative example.

9717

CSO: 4009/139

AUTHOR: GUAN Jiwen [4619 4764 2429]

ORG: Jilin University

TITLE: "On the Odd-Even Property of Linear Automata"

SOURCE: Beijing JISUANJI XUEBAO [CHINESE JOURNAL OF COMPUTERS] in Chinese No 6, Jun 81 pp 401-408

TEXT OF ENGLISH ABSTRACT: According to the state diagrams of linear automata, one can easily see whether their state transformation is odd or even. In this paper some results are reported on the decision of the evenness by elementary divisors, in accordance with the state diagram theories of linear automata.

AUTHOR: CHEN Shihua [7115 0013 5478]

ORG: Institute of Computing Technology, Chinese Academy of Sciences

TITLE: "On the Structure of Weak Inverses of a Weakly Invertible Linear Finite Automaton"

SOURCE: Beijing JISUANJI XUEBAO [CHINESE JOURNAL OF COMPUTERS] in Chinese No 6, Jun 81 pp 409-419

TEXT OF ENGLISH ABSTRACT: This paper gives an account of a method by which one may find out all weak inverse linear finite automata with delay τ for a weakly invertible linear finite automaton with delay τ . This method consists of two steps. First, given a weakly invertible linear finite automaton M with delay τ , find out all transfer function matrices of weak inverse linear finite automata with delay τ of M . Then, for any such transfer function matrix $H^n(z)$, one may find out all weak inverse linear finite automata with delay τ of M , the transfer function matrices of which are the same $H^n(z)$.

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ORG: Both of the Institute of Mathematics, Chinese Academy of Sciences

TITLE: "The Self-compiler of the System Assembler Language XHY"

SOURCE: Beijing JISUANJI XUEBAO [CHINESE JOURNAL OF COMPUTERS] in Chinese No 6,
Jun 81 pp 420-430

TEXT OF ENGLISH ABSTRACT: XHY is one of the basic tools used to transport software in the XR project. This paper describes a self-compiler of XHY, including its basic ideas and techniques, concentrating mainly on two problems, i.e., the implementation of some peculiar language constructs in XHY and the design and implementation of self-compiling, multistage operation and transportation.

AUTHOR: GENG Lida [5105 4539 1129]

ORG: Institute of Computing Technology, Chinese Academy of Sciences

TITLE: "Fundamental Principles of JF-111, a Multilingual Machine Translation System"

SOURCE: Beijing JISUANJI XUEBAO [CHINESE JOURNAL OF COMPUTERS] in Chinese No 6,
Jun 81 pp 431-439

TEXT OF ENGLISH ABSTRACT: The JF-111 system is designed as a machine translation system for natural languages which is capable of multilingual translation when it is provided with linguistic data in a general and well-known form. Some tests have been carried out on the translations from English to Chinese, German to Chinese and French to Chinese.

The system exhibits a series of important characteristics in the strategy of designing software implementation and application:

1. The system has adopted some concepts and approaches from mathematical linguistics and compiler construction techniques.
2. The software system is applicable to many natural-language translations. Its program does not have to be revised with the change of the input languages.
3. Operation and quality improvements are highly automated so that manpower is saved and efficiency raised.

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TITLE: "On the Use of CMOS Ternary Gates to Realize a Self-checking Binary Logic System"*

SOURCE: Beijing JISUANJI XUEBAO [CHINESE JOURNAL OF COMPUTERS] in Chinese No 6, Jun 81 pp 440-449

TEXT OF ENGLISH ABSTRACT: A scheme is proposed by which ternary gates realized with CMOS technology implement a self-checking binary system. All single faults in these gates can be divided into three types, called mid-seeking, mid-rejecting and masked. It is proven that the binary logic system realized with these gates is totally self-checking for mid-seeking faults. For mid-rejecting faults, the system is shown to be easily testable. A procedure for deriving test codes for mid-rejecting faults is presented. In addition, the effects of masked faults in the system are analyzed.

* This work was conducted at the Department of Electrical Engineering, University of Toronto.

AUTHOR: LIU Tinghua [0491 1656 5478]

ORG: Computing Technique Research Institute, China Aeronautical Establishment

TITLE: "On Efficiency Computation and Generation of Test Bit Patterns for Digital Magnetic Recording"

SOURCE: Beijing JISUANJI XUEBAO [CHINESE JOURNAL OF COMPUTERS] in Chinese No 6, Jun 81 pp 450-458

TEXT OF ENGLISH ABSTRACT: In this paper, the worst bit patterns of NRZI and Run Length Limited Codes (RLLC) are briefly described. General modes of elementary worst patterns and worst pattern sequences are given. In particular, the model and algorithm of efficiency computation are presented. In addition, a general solution based on J.L. Massey's theory is worked out for the problem of synthesizing the shortest Linear Feedback Shift Register (LFSR) capable of generating a finite sequence of worst patterns. As an example, a 16-bit worst pattern of NRZI code and its generator are given.

AUTHOR: ZHANG Xiang [1728 4382]
GAO Qingshi [7559 1987 3740]

ORG: Both of the Institute of Computing Technology, Chinese Academy of Sciences

TITLE: "Principle of Automatic Vector-Displacement and Its Iteration"

SOURCE: Beijing JISUANJI XUEBAO [CHINESE JOURNAL OF COMPUTERS] in Chinese No 6, Jun 81 pp 459-467

TEXT OF ENGLISH ABSTRACT: This paper introduces an interconnection network of cellular vector computer of vertical and horizontal processing with virtual common memory. In regard to this network a principle of automatic vector-displacement is presented, and a necessary and sufficient condition of conflict-free vector-displacement is given. To solve the problem of vector-displacement conflict caused by either memory bank conflict or transmission path conflict, an iterative method of automatic vector-placement is further proposed. Finally, some results of both probability estimation and digital simulation for the number of displacement iterations of an evenly distributed random address vector are given.

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ORG: All of the Institute of Computing Technology, Chinese Academy of Sciences

TITLE: "An Efficient Parallel Algorithm for Solving a Linear System of Algebraic Equations"

SOURCE: Beijing JISUANJI XUEBAO [CHINESE JOURNAL OF COMPUTERS] in Chinese No 6, Jun 81 pp 468-475

TEXT OF ENGLISH ABSTRACT: When the Gaussian elimination method is used for solving a linear system of algebraic equations on an array processor or a cellular vector computer, the main operation is to perform a great many row vector transformations. Assume that a computer consists of S parallel processors and is used to solve an N -order equation system. In the case of $S \gg N$, the system efficiency will be very low because of the fact that at least $(S-N)$ processor are not at work in row vector transformations. This paper proposes a parallel algorithm which can be realized on a Cellular Vector Computer of Vertical-Horizontal Processing with Virtual Common Memory to enhance greatly the system efficiency.

AUTHOR: ZHANG Jinwen [1728 6930 2429]

ORG: Institute of Computing Technology, Chinese Academy of Sciences

TITLE: "Higher Order and Transfinite Incompleteness"

SOURCE: Beijing JISUANJI XUEBAO [CHINESE JOURNAL OF COMPUTERS] in Chinese No 6, Jun 81 pp 476-478

TEXT OF ENGLISH ABSTRACT: *Definition 1.* Let K be the number-theoretic formal system. The formula $P(x)$ (where x is a variable, $P(x)$ contains x free, and $P(x)$ does not contain another variable free) in K is said to be the formalization of the provability, if for any statement A in K , we have

- (1) If K is consistent, then: $\vdash A \Rightarrow \vdash P(A)$;
- (2) If K is consistent, then: $\vdash \neg A \Rightarrow \vdash \neg P(A)$;
- (3) If K is ω -consistent, then: $\vdash P(A) \Rightarrow \vdash A$,

where \bar{A} denotes the Gödel number of the formula A . In the present paper we give the construction of the provability $P(x)$.

Definition 2. For any formalization of the provability $P(x)$, and any statement A , we put

$$\begin{aligned} A_0 &= A, \quad A_{i+1} = \neg P(\bar{A}_i), \\ A^0 &= \neg A, \quad A^{i+1} = \neg P(\bar{A}^i), \end{aligned}$$

[Continuation of JISUANJI XUEBAO No 6, Jun 81 pp 476-478]

where $i = 0, 1, 2, \dots$. It is clear that A_i, A^i are all uniquely determined by formulas $A, P(x)$ and natural number i .

Theorem 1. If K is consistent, for any formalization of the provability $P(x)$ and any natural number n , then there is a statement A , such that

$$\neg \vdash A, \quad \neg \vdash A^i,$$

where $i = 0, 1, 2, \dots, n$, and " $\neg \vdash B$ " denotes " B is unprovable in K ."

Theorem 2. If K is consistent, for any formalization of the provability $P(x)$, then there is a statement A , such that

$$\neg \vdash A, \quad \neg \vdash A^i,$$

where $i = 0, 1, 2, \dots$.

AUTHOR: WANG Yuansong [3769 0337 2646]
HUA Younian [5478 2589 1628]
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TITLE: "Laser Chinese Character Printer"

SOURCE: Beijing JISUANJI XUEBAO [CHINESE JOURNAL OF COMPUTERS] in Chinese No 6,
Jun 81 pp 479-480

TEXT OF ENGLISH ABSTRACT: This paper describes the main features and operating principle of the laser Chinese character printer and its connection situation with the electronic computer DJS-6, whose capabilities are also described. The printer weighs under 150 kg and prints 500-1000 characters per second.

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CSO: 4009/124

Engineering

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TITLE: "Pansystem Methodology"

SOURCE: Wuhan WUHAN JIANCAI XUEYUAN XUEBAO [JOURNAL OF WUHAN INSTITUTE OF BUILDING MATERIALS] in Chinese No 3, 1981 pp 1-8

TEXT OF ENGLISH ABSTRACT: Pansystem analysis is a new transfield interdisciplinary investigation and application of generalized system-transformation-symmetry in mechanisms. Pansystem methodology is an intersection of pansystems analysis and scientific methodology. It is also a pansystematization of concepts of methodology. Following the author's previous papers, this paper discusses the historical trend of the development of science and presents new panhomomorphism theorems, decomposition theorems, decoupling theorems, co-diagnosis theorems, operation projection theorems and theorems of series-parallel analysis of large-scale pansystems. These theorems are transfield and will be used in mathematics, methodology, graph theory, theory of fuzzy sets, cybernetics, large-scale system theory, system engineering, etc.

AUTHOR: ZHANG Nanlun [1728 0589 4858]

ORG: Wuhan Institute of Building Materials

TITLE: "The Membership and Probability Characteristics of Random Appearances (III)"

SOURCE: Wuhan WUHAN JIANCAI XUEYUAN XUEBAO [JOURNAL OF WUHAN INSTITUTE OF BUILDING MATERIALS] in Chinese No 3, 1981 pp 9-24

TEXT OF ENGLISH ABSTRACT: The membership function of fuzzy subsets can actually be obtained with a sampling survey method. Practice proves there is some stability in the membership frequency derived from the method.

It is intended to show that the fuzzy appearances may fall into the category of random appearances. In this case, the concept of the probability space has to be extended.

AUTHOR: HUANG Shiyuan [7806 1102 0337]

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TITLE: "Hydration of Fly Ash Cement at Elevated Temperatures"

SOURCE: Wuhan WUHAN JIANCAI XUEYUAN XUEBAO [JOURNAL OF WUHAN INSTITUTE OF BUILDING MATERIALS] in Chinese No 3, 1981 pp 25-32

TEXT OF ENGLISH ABSTRACT: The effect of the curing temperature on the strength, CH content and degree of C_3S hydration of fly ash cement and pure cement was studied. The microstructure of the fly ash cement paste was observed by scanning electron microscopy (SEM). It has been found that an addition of a proper amount of gypsum to fly ash cement accelerates the reaction between CH and fly ash and increases the degree of C_3S hydration during steam curing. The change in microstructure with the addition of gypsum was also observed.

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ORG: All of Wuhan Institute of Building Materials

TITLE: "Study of the Structure of Slag Glass and Its Properties"

SOURCE: Wuhan WUHAN JIANCAI XUEYUAN XUEBAO [JOURNAL OF WUHAN INSTITUTE OF BUILDING MATERIALS] in Chinese No 3, 1981 pp 33-43

TEXT OF ENGLISH ABSTRACT: A thorough study of the relationship between the hydraulic activity and the structure of granulated blast-furnace slags is of great importance in revealing the essence of the latent binding property possessed by slags. In the present paper the merits and demerits both of chemical analysis and of the strength test which are in common use and with which the hydraulic activity of slags is characterized have been reviewed; the influence of various cations in the quaternary system of $CaO-MgO-Al_2O_3-SiO_2$ on the structure of slag glass analyzed; and by applying the modern theory of glass structure, the criteria for measuring the hydraulic activity of vitreous Egt, Ent slag and their calculations are proposed. Experiments show that the calculated value of Egt and Ent is correlated under given conditions with the solubility of slags and the compressive strength of the slag cement.

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ORG: Wuhan Institute of Building Materials

TITLE: "The Stability of the Spherically Structural Face on the Stope Roof"

SOURCE: Wuhan WUHAN JIANCAI XUEYUAN XUEBAO [JOURNAL OF WUHAN INSTITUTE OF BUILDING MATERIALS] in Chinese No 3, 1981 pp 45-58

TEXT OF ENGLISH ABSTRACT: The problem of stability of the spherically structural face on the roof of the underground stope is investigated from the two respects of engineering geology and rock mechanics together with the xenolith in Kimberlite pipe. Through analyzing its failure mechanism, the strength condition is indicated, the mechanical model established and the formulas for the diameter of minimum critical safety are derived. Having studied the geological features of rock mass in which the spherical structure face lies, experimented with destructive tests of the combined faces between xenolith and ore, and observed in-situ the stability of xenolith, this paper discusses the relationship between the stability of the spherically structural face on the stope roof and the existence of other types of structural planes, the action of groundwater, the magnitude of corrosion and weathering, and the technological mining process. Finally, measures are proposed to deal with the stability of xenolith on the roof in productive practice.

AUTHOR: SU Fenwei [5685 1164 0251]

ORG: Wuhan Institute of Building Materials

TITLE: "A Study of the Concentrating Theory of Anti-flow Screening--Effects of Air Resistance on the Screening Process"

SOURCE: Wuhan WUHAN JIANCAI XUEYUAN XUEBAO [JOURNAL OF WUHAN INSTITUTE OF BUILDING MATERIALS] in Chinese No 3, 1981 pp 59-76

TEXT OF ENGLISH ABSTRACT: Starting from research of individual granula, the law of movement of aggregate granules of different properties is analyzed when they are affected by air resistance over the screen plate. A new approach to the concentrating mechanism of anti-flow screening is presented, i.e., the concentrating process means the combination of friction concentration with gravity concentration. Two effective means of screening short fibers are also proposed: one is to increase the throwing strength K_y , and the other is to supply intake air on the screen plate or add upstream air under it.

AUTHOR: GONG Gaosun [7895 2640 5549]

ORG: Shanghai Building Materials Specialty School

TITLE: "Computing Cylindricity Error by Least Square Method"

SOURCE: Wuhan WUHAN JIANCAI XUEYUAN XUEBAO [JOURNAL OF WUHAN INSTITUTE OF BUILDING MATERIALS] in Chinese No 3, 1981 pp 77-83

TEXT OF ENGLISH ABSTRACT: When a least square axis equation of an actual cylinder is established, not only the cylindricity error of this cylinder can be determined, but the positional error between the axis and other elements of this measured workpiece can also be determined. Based on the measured data for the actual cylinder, a least square axis equation is drawn in this paper.

AUTHOR: FAN Cunxu [5400 1317 2485]

ORG: Wuhan Institute of Building Materials

TITLE: "Analyzing Frame Systems by Energy Method"

SOURCE: Wuhan WUHAN JIANCAI XUEYUAN XUEBAO [JOURNAL OF WUHAN INSTITUTE OF BUILDING MATERIALS] in Chinese No 3, 1981 pp 85-96

TEXT OF ENGLISH ABSTRACT: An energy method is used to analyze frame systems in this paper. The method is very effective for calculating continuous beams and any frame system. The effects of various support conditions, loads and different external factors (such as displacement of supports and temperature changes) on the structure are analyzed.

AUTHOR: LI Guiqing [2621 2710 7230]
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ORG: Both of Wuhan Institute of Building Materials

TITLE: "The Influence of the 'P-Delta' Effect on Nonlinear Dynamic Earthquake Responses--An Analysis of Stiffness of Bar Members in Consideration of the Nonlinearity and Geometrical Nonlinearity of Materials under Conditions of a Large Deflection"

SOURCE: Wuhan WUHAN JIANCAI XUEYUAN XUEBAO [JOURNAL OF WUHAN INSTITUTE OF BUILDING MATERIALS] in Chinese No 3, 1981 pp 97-109

TEXT OF ENGLISH ABSTRACT: Based on the principle of energy variation, a stiffness matrix of bar members is presented here, including the influence of shear deformation of the member itself, and taking the nonlinearity and geometrical nonlinearity of materials into consideration. Two kinds of implication of the "P-Delta" effect are analyzed. The working conditions of the bar member at the elasto-plastic stage are rather comprehensively represented.

AUTHOR: LI Guiqing [2621 2710 7230]
SHI Zhe [4258 2678]

ORG: Both of Wuhan Institute of Building Materials

TITLE: "A Method for Estimating Free Flexural Vibrations of Cantilever Bar of Multi-step Varying Cross Sections with Lumped Mass"

SOURCE: Wuhan WUHAN JIANCAI XUEYUAN XUEBAO [JOURNAL OF WUHAN INSTITUTE OF BUILDING MATERIALS] in Chinese No 3, 1981 pp 111-122

TEXT OF ENGLISH ABSTRACT: The free flexural vibration of cantilever bar of multi-step varying cross sections with lumped mass is studied in this paper. The mass and stiffness of the cantilever bar are shown respectively by

$$\begin{aligned}\overline{m}_i(x) &= a_i(1 + \beta_i x)^r \\ \overline{k}_i(x) &= \alpha_i(1 + \beta_i x)^{r+2}\end{aligned}$$

The differential equation of the vibration mode is changed to Bessel's equation, and the relationship between the angle θ_i of rotation at the end of every step and its absolute displacement A_i is represented in terms of finite difference, i.e.,

$$\theta_i = \frac{A_{i+1} - A_{i-1}}{h_{i+1} - h_{i-1}} \quad i = 1, 2, \dots, n-1$$

[Continuation of WUHAN JIANCAI XUEYUAN XUEBAO No 3, 1981 pp 111-122]

$$\theta_n = \frac{A_n - A_{n-1}}{h_n - h_{n-1}}$$

In these formulas, h_i represents the height from the ground to the lumped mass. Then, the formula expressing the Bessel function can be derived.

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TITLE: "A Study of the Dynamic Property of Frame Structure Light Slab Buildings"

SOURCE: Wuhan WUHAN JIANCAI XUEYUAN XUEBAO [JOURNAL OF WUHAN INSTITUTE OF BUILDING MATERIALS] in Chinese No 3, 1981 pp 123-141

TEXT OF ENGLISH ABSTRACT: Several main forms of structure and characteristics of the system of frame structure light slab buildings are briefly commented on. Through the pulsation test of buildings which were experimentally constructed of frame structures and light slabs in eight large cities of China, and by testing and analysis of sudden unloading for two houses, the dynamic property of these new types of buildings has been investigated and a calculating method is advanced.

9717

CSO: 4009/144

Geology

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TITLE: "On the Relationships between the Uranium Deposits and the Regional Geological Setting in the Meso-Cenozoic Continental Clastic Rocks of China"

SOURCE: Beijing DIZHI XUEBAO [ACTA GEOLOGICA SINICA] in Chinese Vol 55 No 4, 1981 pp 290-296

TEXT OF ENGLISH ABSTRACT: The uranium deposits of the continental clastic rock type of China may be classified into four types:

1. Uranium mineralization in the stable regions. Such regions are situated in platforms with early consolidated basements, and characterized by gently folded sedimentary strata, with minor disconformities and little magmatic activity. As there were no good source rocks for uranium, it is hardly possible to find large uranium deposits in the stable regions.
2. Uranium mineralization in the strongly active regions. Such regions are strongly folded and faulted, with intense magmatism, so that the depositional environment for the uranium mineralization to take place was very unstable. For this reason there was not sufficient time for the formation of large uranium deposits, either primary or secondary. But within such a region there might exist

[Continuation of DIZHI XUEBAO Vol 55 No 4, 1981 pp 290-296]

some less active areas where better deposits could be found.

3. The uranium in semi-stable regions. Such regions are situated in the transition zone between the stable region and strongly active region, or in the intermontane basin and the piedmont depression of a mountain belt. Due to the intermediate type of stability, both the paleogeography and the environment of sedimentation are more favorable for uranium mineralization to take place than the above-mentioned two types. Moreover, magmatic activity usually occurs in such a region so that large uranium deposits might be formed.
4. Uranium mineralization of the superimposed type (the early-formed sedimentary mineralization enriched by later magmatic activities). Such a type of uranium mineralization may be found in the stable, semi-stable and even in the active regions. It is characterized by the fact that there existed a stable erosion period in which a weathering crust developed, leading to the formation of uraniferous beds. This might be followed by magmatic activities which helped to redistribute and enrich the uranium in the uraniferous beds. By the process of multiple redistribution and enrichment of uranium, large uranium deposits may be formed.

A comparison between the clastic uranium deposits of the United States and those of China is also made in the paper.

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CSO: 4009/150

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TITLE: "Numerical Solution of Elastic Energy of Elliptic Inclusions Oriented in $\langle 100 \rangle$, $\langle 110 \rangle$ and $\langle 111 \rangle$ Directions in Cubic Crystals"

SOURCE: Shenyang JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese No 5, 1981 pp 489-505

TEXT OF ENGLISH ABSTRACT: The elastic inclusion problem, that is, the calculation of the stress-strain field and the elastic energy of an anisotropic elastic medium with an elastic inclusion contained in it, is one of the important problems in materials science. In particular, the variation of the elastic energy of the system with the orientations of the inclusion in the medium (i.e., the orientational dependence of the elastic energy) and the orientation of the inclusion corresponding to the minimum of the elastic energy of the system are of great theoretical and practical significance in the investigations of the habit orientations of the phase transformations and precipitate particles, the prediction of the microcracking

[Continuation of JINSHU XUEBAO No 5, 1981 pp 489-505]

direction as well as the optimum distribution of the reinforcement fibers in the composites.

Based on the "Point Force-Line Force Method" given by H.Y. Yang and Y.T. Chou in 1976, a general computer program is compiled, which is applicable to the numerical calculation of the elastic energy of the elliptical inclusion oriented in any direction of the anisotropic medium for the generalized plane problem. The values of the elastic energy of the elliptic inclusions with their cylinder axes along the $\langle 100 \rangle$, $\langle 110 \rangle$ and $\langle 111 \rangle$ directions in cubic metals Fe, Nb and Al were computed, and the dependence of elastic energies on the orientation of cross elliptic sections, rotating around their cylinder axes, has been illustrated explicitly in graphic charts.

The following conclusions are deduced from the calculation results:

1. The system has its elastic energy when the inclusion is lying on the crystal planes and oriented along the crystal directions of low indexes.
2. The elastic energy of the system with the inclusion subjected to pure shear strain is one-third to one-half of that with the inclusion subjected to principal strain.
3. The elastic energy of the anisotropic system with thin plate inclusions is very small. As the elliptic index $\epsilon = \frac{b}{a} \rightarrow 0$, the elastic energy of the system approaches nil.

[Continuation of JINSHU XUEBAO No 5, 1981 pp 489-505]

4. If the boundary energy could be neglected, the new phase and the precipitate with the lowest elastic energy would take the thin plate shape and shear mode in phase transformations and precipitation.

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TITLE: "Martensitic Transformation and Shape Memory Effect of Cu-32.23 percent Zn-1.84 percent Al Alloy"

SOURCE: Shenyang JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese No 5, 1981 pp 506-512

TEXT OF ENGLISH ABSTRACT: The modifications of martensitic transformation and the shape memory effect of Cu-32.23 percent Zn-1.84 percent Al alloy have been studied. A thin plate-like elastic martensite is found after the alloy quenched into cooling medium of higher temperatures, namely, of smaller T_q-M_s . In addition, the butterfly-like bursting martensite may be partly formed after being quenched under lower temperatures of T_q-M_s . The transformation into bursting martensite increases in amount with the decrease of quenching temperature, and is completed at -70°C . Experimental results indicate that the shape memory effect of the alloy is only related to the transformation behavior. The martensite of the thin plate-like type, other than that of the butterfly-like bursting mode, has such an effect. The growth and disappearance of induced martensite plates under bending stress have also been directly observed by the optical microscope.

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TITLE: "Studies of Carbides in 6Cr4Mo3Ni2W Steel"

SOURCE: Shenyang JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese No 5, 1981
pp 513-521

TEXT OF ENGLISH ABSTRACT: The carbides in 6Cr4Mo3Ni2W steel have been studied by TEM, electrolytic extraction phase analysis, X-ray diffraction and EMPA. It was confirmed that the M_2C with long-range ordered carbon distribution and V_4C_3 with short-range ordered vacancy distribution are present in the residual carbides of the steel quenched from 1120°C. The nucleation of V_4C_3 with concomitant M_2C was observed during the tempering precipitation. The distribution of alloying elements partitioned between steel matrix and carbides is thus ascertained.

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TITLE: "Solution and Transformation of Ni₃Zr in Cast Nickel-base Superalloy"

SOURCE: Shenyang JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese No 5, 1981
pp 522-528

TEXT OF ENGLISH ABSTRACT: Studies were made of the solution and transformation of intermetallic compound Ni₃Zr in Zr-bearing cast Ni-base superalloy and of the effect of the Zr addition on the microstructure of DTA together with metallographic observation. The occurrence of Ni₃Zr in the superalloy may markedly decrease the incipient melting temperature and induce the solution of $\gamma+\gamma'$ eutectic. Under high temperature exposure above 850°C, Ni₃Zr with γ (C) is transformed into ZrC and γ , which is bound to be reflected in DTA.

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ORG: ZHANG, BAO, JIANG and LU all of the Institute of Shanghai General Petrochemical Works; LIN, DAI and DONG all of the Physics Department, Fudan University; HUANG and XU both of Shanghai Institute of Material Research

TITLE: "An XPS Study of Anodic Oxide Film on 1Cr18Ni9 Stainless Steel"

SOURCE: Shenyang JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese No 5, 1981 pp 529-540

TEXT OF ENGLISH ABSTRACT: The XPS has been used to study the composition and structure of the oxide film on stainless steel. The film was formed in the transpassive region during the anodic polarization in H_2SO_4 and after treatment with Na_2MoO_4 . It has been found that the ratio of Cr to Fe in the film is about three times higher than that in the bulk. The analysis of the valence states showed

[Continuation of JINSHU XUEBAO No 5, 1981 pp 529-540]

that the distribution of each constituent in the film is not uniform. The film has a three-layer structure. The outer layer is rich in OH^- and the middle layer consists mainly of Cr_2O_3 and Fe_2O_3 , while the rest of the layer up to the interface contains the Fe^{2+} and Fe^0 . The Mo ions have been found throughout the film. The possible mechanism for passivation of the anodic polarization in the transpassive region was discussed and a comparison was made with other oxide films.

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TITLE: "A Study of Hydrogen Effect on Deformation and Fracture Microprocess in Pure Iron"

SOURCE: Shenyang JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese No 5, 1981 pp 541-548

TEXT OF ENGLISH ABSTRACT: The effect of hydrogen on the deformation and fracture microprocess in pure iron has been studied by means of the tensile test and observation in S4-10 SEM using cathodic charged specimens. The main results are as follows:

1. With the increase of hydrogen content, namely, from 5.4 up to 31.0 cm³/100 g, the yield strength increases slightly, the flow stress and fracture strength increase obviously, but the fracture strain decreases remarkably. The lower yield point and Luders band disappear when the hydrogen content exceeds 18.7 cm³/100 g.

[Continuation of JINSHU XUEBAO No 5, 1981 pp 541-548]

2. The nucleation of a microcrack is predominantly on the slip plane and the microcrack propagates along subboundaries when hydrogen content is below 10 cm³/100 g. The nucleation of a microcrack is on the grain boundaries and the microcrack propagates in a zigzag way when hydrogen content exceeds 16 cm³/100 g. The former is a transgranular fracture and the latter is a mixed fracture of transgranular and intergranular type.

3. The characteristics of the hydrogen embrittlement in pure iron are: (1) the slip lines on the specimen surface decrease obviously, and (2) the microfracture of brittle feature is formed and increased. This seems to be due to the fact that the dissolved hydrogen in pure iron decreases the plastic deformation.

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TITLE: "On the Longitudinal Cracks in 30CrMnSiNi2A Electroslag Ingot"

SOURCE: Shenyang JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese No 5, 1981 pp 549-557

TEXT OF ENGLISH ABSTRACT: The cause and remedy of the longitudinal cracking in 30CrMnSiNi2A electroslag ingot have been investigated. Results show that the cracks are initiated by the microsegregated C, P, S, Si, etc., along the primary austenite boundaries which become fragile and crack under higher thermal stress. Al is injurious due to promotion of the microsegregation of the elements and brittle fracture of grain boundaries rather than formation of the AlN. An effective remedy for longitudinal cracks in 30CrMnSiNi2A electroslag ingot is to keep the residual amount of Al under control if the heat-retaining condition is restricted after stripping the ingot.

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TITLE: "Crack-tip Fracture Stress under General Yielding of Ligament"

SOURCE: Shenyang JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese No 5, 1981 pp 558-564

TEXT OF ENGLISH ABSTRACT: The criterion of maximum shear stress for crack extension, namely, the critical fracture stress at the crack tip, $(\sigma_{yy})_c = \sigma_F$, was verified as applicable to the ductile fracture in the range between -100°C and room temperature. Considering the independence of this criterion and the critical fracture stress at crack tip upon temperature, the observed phenomenon in which J_c decreases with decreasing temperature may be qualitatively explained. The specimen geometry and the curvature radii of notch root are not affected by the average fracture strength, but are affected by the true fracture strain. Therefore, the fracture strength is probably an important descriptive parameter of mechanical properties of materials.

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TITLE: "Ideal ECP Maps for Different Cubic Crystals and Their Rapid Indexing Method"

SOURCE: Shenyang JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese No 5, 1981 pp 565-577

TEXT OF ENGLISH ABSTRACT: A set of ideal ECP maps for different cubic crystals was theoretically delineated by using the stereographical projection method of crystal planes. The data given by the maps are tabulated as a new convenient chart for rapidly indexing the FCP of cubic crystals experimentally obtained. This method saves time wasted from that already indexed. The error analysis shows that the present indexing method seems to be available for the cases of the zone axis, both parallel and inclined, and to the optical axis of SEM.

AUTHOR: YU Guocheng [6735 0948 1004]

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TITLE: "On the Elimination of Polymorphism of Oxide Solid Solutions"

SOURCE: Shenyang JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese No 5, 1981 pp 578-582

TEXT OF ENGLISH ABSTRACT: A thermodynamical study was made of the problem concerning elimination of polymorphism of oxide solid solutions. The understandings on the elimination of polymorphism of ZrO_2 or SiO_2 given by various authors in the past five decades were reviewed, and found to be contradictory. Derivation on elimination of polymorphism has been performed as:

$$x_h(G_L^0 - G_h^0) > (\Delta G_{mh} - \Delta G_{ml})$$

where x_h is the mol percent of solvent in high temperature modification of the solid solution, G_L^0 or G_h^0 is the free energy of solvent under standard conditions for lower or higher temperature modification respectively, and ΔG_{mh} or ΔG_{ml} is the free energy of mixing of the solid solution for higher or lower temperature modification respectively. It is only in the case of the elimination of polymorphism that the difference between G_L^0 and G_h^0 is much greater than that of ΔG_{mh} and ΔG_{ml} . Due to the identity of the chemical bonds or coordination numbers between high and

[Continuation of JINSHU XUEBAO No 5, 1981 pp 578-582]

low temperature modifications of oxides, these differences are very small and, therefore, the polymorphism of oxide solid solutions possessed of polymorphism originally will not be eliminated.

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TITLE: "Yield Strength of Metals and Alloys"

SOURCE: Shenyang JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese No 5, 1981 pp 583-594

TEXT OF ENGLISH ABSTRACT: A review covering the present state of yield strength of metals and alloys is presented. Emphasis is placed on slip and dislocation, multiplication of dislocations, plastic flow rate equation, Peierls stress, temperature dependence of the yield stress and effect of solute atoms.

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CSO: 4009/131

Nonferrous Metals

AUTHOR: None

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TITLE: "Practice of Recovering Ore Bodies under a River Bed and Important Buildings Using Cement Filling Method"

SOURCE: Beijing YOUSE JINSHU [NONFERROUS METALS] in Chinese No 4, 1981 pp 1-6

TEXT OF ENGLISH ABSTRACT: The room-and-pillar method has been used with regular pillars for many years at the South and North Mines of Xikuangshan Mining Administration in order to safeguard the river bed and surface buildings, and, as a result, a lot of safety pillars have had to be left over. Only the safety pillars underlying the river bed below the No 6 level at the South Mine account for 15-30 percent of the total ore within this level. In addition, large open areas left without any support caused several violent large-scale surface subsidences. To avoid this, the mining method with cement filling has been tested and introduced at these mines.

The method features two mining steps: the first is mining the ore ribs followed by cement filling, while the second is mining the rooms followed by tailing filling. Mining areas are divided along the stroke every 60-120 m, with each area subdivided into 6-10 ore ribs and rooms. Stopping starts from the center and advances toward the side wings, with the ore ribs to be recovered first. Rooms are to be mined after the ore ribs on both sides are cement-filled to join the roof.

[Continuation of YOUSE JINSHU No 4, 1981 pp 1-6]

Long term observations have shown that the average monthly surface subsidence has been only 2 mm since the filling method was adopted for recovering the safety pillars under the river bed at the South Mine, which cannot harm mining operation and surface buildings. The recovery has been raised by 12-13 percent compared with the room-and-pillar technology, resulting in production of more than 1670 tons of antimony foods, and more profits have been gained in spite of additional expenses for filling work.

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TITLE: "A Study of the YYG-80 Hydraulic Drill"

SOURCE: Beijing YOUSE JINSHU [NONFERROUS METALS] in Chinese No 4, 1981 pp 7-11

TEXT OF ENGLISH ABSTRACT: In this paper, a series of research works on the YYJ-80 hydraulic drill are summarized. A comparison of advantages and shortcomings between the hydraulic drill and pneumatic drill is carried out, and the principles, structure design theoretical computations, laboratory tests of the YYG-80 hydraulic drill and its field tests are introduced in detail.

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TITLE: "On the Selection of Low Emission Diesel Engines for Underground Mining"

SOURCE: Beijing YOUSE JINSHU [NONFERROUS METALS] in Chinese No 4, 1981 pp 19-23

TEXT OF ENGLISH ABSTRACT: A comparison has been made between air-cooled indirect injection (IDI) and water-cooled, turbocharged direct injection (DI) diesel engines (the latter both two-stroke and four-stroke cycle) from the standpoint of exhaust emission, fuel consumption, etc. These comparisons are made mainly on the basis of laboratory tests carried out at the University of Lulea, Sweden.

Our measurements have confirmed that the hazardous emissions from IDI engines are somewhat lower than those from DI engines. This is, however, balanced by important advantages of the four-stroke cycle DI engines, such as lower fuel consumption, lower production and maintenance costs, lower tare weight, etc. Now the future of the DI engine seems to be very bright because sophisticated techniques (the combination of turbocharging, air charge cooling and fuel injection) can lower the NO_x emissions, so in the future it may be that DI engines will be considered more suitable for underground mining than the currently-favored IDI engines.

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TITLE: "Practice in the Automation of Mine Hoists"

SOURCE: Beijing YOUSE JINSHU [NONFERROUS METALS] in Chinese No 4, 1981 pp 24-29

TEXT OF ENGLISH ABSTRACT: This article describes the practice and successful experience of the Beijing Central Design and Research Institute for Nonferrous Metallurgical Industry in mining hoist automation since 1963. The author has analyzed the advantages and the applied conditions of two types of motor driving hoists: the automatic AC wound motor driving hoist with dynamic brake, micro-driving, doubly fed with a static frequency converter to adjust the speed and low-frequency driving; and the automatic DC motor driving hoist supplied by motor-converter or thyristor-converter.

The author also presents the idea of "ore transport using computer control and management" to combine underground transport with the hoisting and achieve higher productivity and lower cost in transport and assure more even ore quality.

AUTHOR: LIU Chuanlin [0491 0278 7792]

ORG: Heshan Lead-Zinc Mine, Guangxi

TITLE: "Separation of Copper-Lead Bulk Concentrate by Sodium Silicate Mixture"

SOURCE: Beijing YOUSE JINSHU [NONFERROUS METALS] in Chinese No 4, 1981 pp 30-33

TEXT OF ENGLISH ABSTRACT: Based on the previous investigation and productive results, the applied research on separation of copper-lead bulk concentrate by the addition of biochromate, CMC, sodium silicate, sodium silicate mixture (I) and sodium silicate mixture (II) was made. The industrial test and comparison of the metallurgical results have shown that sodium silicate mixture, especially sodium silicate mixture (II), is the most effective. From the copper-lead bulk concentrate assaying 3.4 percent Cu and 60.46 percent Pb, the following results of a copper concentrate grade 24.19 percent, with a recovery of 88.99 percent, can be obtained, lead concentrate grade and recovery being 68.70 percent and 99.39 percent respectively. The merits of sodium silicate mixture are as follows: easy making-up; no poison; no odor; good metallurgical results.

Sodium silicate mixture is now being applied at a copper-lead-zinc processing plant and good results have been achieved.

AUTHOR: JIN Wenrong [6855 2429 2837]

ORG: None

TITLE: "Analysis of Precision Concerning Determination of Particle Liberation"

SOURCE: Beijing YOUSE JINSHU [NONFERROUS METALS] in Chinese No 4, 1981 pp 34-40

TEXT OF ENGLISH ABSTRACT: This article gives some suggestions for increasing the precision of particle liberation determination according to the analysis of factors affecting it. Its emphasis is put on the mathematical analysis of the errors occurring in determination by the plane section and the correction coefficients are related. It has been proved from geometric analysis of the simplified intergrown particles of equal axis which are shown in an adjacent distribution that the probabilities of the intergrowth shown in the plane section, by intergrown particles for valuable minerals that make up 1/2, 1/4 and 3/4, are 0.67, 0.65 and 0.65 respectively; the probabilities for free particles of valuable minerals are 0.165, 0.10 and 0.25, respectively, and the probabilities for gangue free particles are 0.165, 0.25 and 0.10, respectively. The probabilities of intergrowth for the valuable mineral to make up 1/2 by the section for intergrowth in the three kinds of intergrown particles are 0.5, 0.25 and 0.25 respectively; the probabilities of intergrowth for the valuable mineral to make up 1/4 are 0.25, 0.59 and 0.16 respectively, and the probabilities for intergrowth to make up 3/4 are 0.25, 0.16 and 0.59 respectively. The results of the simulated experiment have a rather good

[Continuation of YOUSE JINSHU No 4, 1981 pp 34-40]

agreement with the analytical value of theory. According to the data mentioned above, the concrete method for the stereometric correction of the results from the plane determination is given in the article. The method can make the results corrected from the plane determination more close to the stereometric condition.

The author suggests that by application of mathematical statistics, the reliability of the determined results of the particle liberation can be analyzed. By application of the big samples of some ore samples, the author has proved with K-S examination that the data obtained from the liberation determination for the mixed ore sample fit in well with the normal distribution. So the reliability of the determined results can be analyzed by using the Student's Distribution and the errors can be calculated. This method is simple. The corresponding relation between the amount of the particles determined and the amount of errors can be calculated by substituting the standard deviation of the big samples for that of the population. By doing so, the amount of the particles needed to be determined can be known according to the errors.

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ORG: Kunming Institute of Technology

TITLE: "The Thermodynamics and Constitution of Binary Silicate Melts"

SOURCE: Beijing YOUSE JINSHU [NONFERROUS METALS] in English No 4, 1981 pp 41-49

TEXT OF ENGLISH ABSTRACT: In this paper a chemical bonding model is presented to describe the thermodynamics and constitution of binary silicate systems in an empirical way. The proposed parametric functions of chemical bonds lend support to the work of Masson and associates and offer a satisfactory explanation for the anomalies concerning activity, immiscibility and compound formation in the binary silicate.

AUTHOR: TANG Jigang
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ORG: None

TITLE: "Behavior of Sulfur during Selective Reduction Roasting-Ammonia Leaching Process for Extracting Nickel from Laterites"

SOURCE: Beijing YOUSE JINSHU [NONFERROUS METALS] in Chinese No 4, 1981 pp 50-55

TEXT OF ENGLISH ABSTRACT: The behavior of sulfur contained in heavy oil fuel during the roasting of laterites and the effect of the sulfur on the quality of nickel powder product were investigated from the viewpoint of phase composition and thermodynamics. It was shown that sulfur was almost completely absorbed by calcite in the ore, forming anhydrite (CaSO_4) which was, in turn, reduced to oldhamite (CaS) in the subsequent reduction procedure. The latter was exactly the source of unsaturated sulfur in the ammoniacal heazlewoodite (Ni_3S_2) if it had not been oxidized prior to hydrogen pressure reduction. As a result, the total sulfur content in commercial nickel powder would rise to an unacceptable level.

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ORG: Hebei Normal University

TITLE: "Studies of Thermodynamics of Aqueous Solutions"

SOURCE: Beijing YOUSE JINSHU [NONFERROUS METALS] in Chinese No 4, 1981 pp 56-62

TEXT OF ENGLISH ABSTRACT: For the purpose of comparing the stability of all species M_i in $M-H_2O$ systems, we have proposed a new concept—thermodynamically relative stability exponent D , with reference to the most stable elementary substance of the element M , M_1 . The exponent for all species M_i was a function of the properties inherent in them and the circumstantial factors, i.e.,

$$D_{M_i} = \frac{x_i F(E - E_i^0)}{2.303RT} + m_i \text{ pH} \\ (i=1, 2, 3, \dots, k)$$

Applying the set principle to equilibria of the multispecies system, the following equations were obtained:

1. Under given conditions (E , pH , T), the quantity ratio of all species was

$$\{M_i\}^{1/A_i} : \{M_j\}^{1/A_j} : \dots = 10^{D_{M_1}} : 10^{D_{M_2}} : \dots \\ (E, \text{pH}, T)$$

[Continuation of YOUSE JINSHU No 4, 1981 pp 56-62]

2. Over a wide range of E - pH - T , the distribution equation of all species in $M-H_2O$ systems was

$$\sum_i \text{Max} \{D_{M_1}, D_{M_2}, D_{M_3}, \dots, D_{M_k}\} \\ \text{space of } E\text{-pH-}T$$

Based on the above equations, a general source program for $M-H_2O$ systems has been compiled with ALGOL and used to compute E - pH diagrams and other thermodynamic data.

AUTHOR: ZHU Yingyao [2612 5391 1031]

ORG: Daye Nonferrous Metal Company, Hubei Province

TITLE: "Discussion on Copper Smelting Technique at the Ancient Tonglushan Mine Smelting Ruins"

SOURCE: Beijing YOUSE JINSHU [NONFERROUS METALS] in Chinese No 4, 1981 pp 63-67

TEXT OF ENGLISH ABSTRACT: This paper describes the process and results of simulating test of the ancient smelting technique at Tonglushan.

The old shaft furnace for copper smelting and the remaining excavated slag, in combination with the simulating test, have been investigated. The technical problems of the ancient copper smelting technology, the furnace structure, the air blower, the operating technique and the building of the furnace shaft have also been discussed. The author tries to make the ancient copper smelting revive before the readers through discussions of the old smelting technique.

AUTHOR: LI Zhongjun [2621 0112 0971]

ORG: Institute of Natural Science History, Chinese Academy of Sciences

TITLE: "Mercury Ore Producing Areas Recorded in Ancient Literature of China"

SOURCE: Beijing YOUSE JINSHU [NONFERROUS METALS] in Chinese No 4, 1981 pp 68-70

TEXT OF ENGLISH ABSTRACT: The Chinese people have a long history of using mercury. Long ago, as far back as the Warring States, our ancestors had the knowledge of using gold and silver dissolved by mercury to make gilded gold or silver wares, and using mercury blend as a component of a dose of medicine which had marvelous functions for curing some diseases. According to historical records, this paper describes ancient mercury ore producing areas in chronological order. It will be a great help in the research on the history of mercury production.

AUTHOR: QIU Zhuxian [6726 4554 6343]

ORG: Northeast Institute of Technology

TITLE: "Studies of Reversing Current Electrolysis in the Cryolite-Alumina Molten Salts"

SOURCE: Beijing YOUSE JINSHU [NONFERROUS METALS] in Chinese No 4, 1981 pp 71-72

TEXT OF ENGLISH ABSTRACT: In the cryolite-alumina molten salts electrolysis, the wetting phenomena on the two electrodes are quite different. The anode is poorly wetted while the cathode wetted well. When the current direction is reversed for several seconds, the wettability of the anode becomes better after a short period of "hesitation." There are two good effects:

- (1) a decrease of back electro-motive force;
- (2) quenching and preventing the anode effect. Therefore, it may be beneficial for decreasing the energy consumption in aluminum electrolysis.

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CSO: 4009/132

Optics

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TITLE: "The Six-beam Subnanosecond High Power Nd:glass Laser System"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese No 4, 1981
pp 289-298

TEXT OF ENGLISH ABSTRACT: This paper reports a six-beam subnanosecond high power Nd:glass laser system used for laser plasma research. The characteristics of each of the six beams are the following: the output aperture is $\phi 60$ mm, pulse width (FWHM) is 100 ps, output energy is about 10 J, energy of super fluorescence is less than 1 mJ, pre-pulse is of the order of μ J, beam divergent angle (HM) is 0.5 mrad. Total output power of the six-beam is 0.6 TW.

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TITLE: "Kinetic Simulation of Discharge-excited XeF Laser"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese No 4, 1981
pp 299-304

TEXT OF ENGLISH ABSTRACT: Computer simulant results of kinetic processes of discharge excited XeF laser are given. The reaction equations involve formation, quenching of the XeF and absorption processes of Xe_2^+ , F^- , Boltzman transport equations, the particle and photo rate equations as well as circuit equation are solved together under inductive radiative conditions. Finally, the calculation results are compared with the experimental values.

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TITLE: "Analysis of Tuning Linewidth of the Waveguide Laser"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese No 4, 1981
pp 305-309

TEXT OF ENGLISH ABSTRACT: An intracavity tunable waveguide laser has been developed. Some factors affecting the tuning linewidth are analyzed. The effect of lineshape truncate is calculated quantitatively. The results of the tuning experiments are presented.

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TITLE: "Opto-galvanic Effect Observed in Branch-selected CO Laser"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese No 4, 1981
pp 311-315

TEXT OF ENGLISH ABSTRACT: In this paper the opto-galvanic effect observed in branch selected CO laser is first reported. The possible microscopic processes are proposed and the application of the effect is predicted.

AUTHOR: ZHOU Zhengzhuo [0719 2398 0587]
QIU Mingxin [6726 2494 2450]
ZHENG Guibi [6774 6311 1801]

ORG: ZHOU and QIU both of the Shanghai Institute of Laser Technology; ZHENG of the Shanghai Power Bureau

TITLE: "Helium Cadmium Laser in an Axial Weak Magnetic Field"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese No 4, 1981
pp 317-321

TEXT OF ENGLISH ABSTRACT: It was observed in an axial weak magnetic field that the polarization behavior of a helium cadmium laser was changed, the main polarization axis was rotated, and the laser output was modulated due to the change of the axial magnetic field, etc. These phenomena are called generalized Hanle effect. The computer calculation in theory is in agreement with experimental results.

AUTHOR: TAO Chunkan [7118 4783 1030]

ORG: Xi'an Institute of Applied Optics

TITLE: "Degrees of Freedom of Aberrated Images Under the Illumination of Incoherent Light"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese No 4, 1981
pp 323-329

TEXT OF ENGLISH ABSTRACT: The degrees of freedom of imaging will change when an optical system under the illumination of incoherent light suffers from symmetrical and unsymmetrical aberrations. The reason for this change is given and the equations are derived.

AUTHOR: ZHU Shaoji [4376 4801 4614]

ORG: Shanghai Optical Instrument Research Institute

TITLE: "A Method for Controlling the Groove Shapes of Blaze Holographic Gratings"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese No 4, 1981
pp 331-334

TEXT OF ENGLISH ABSTRACT: A detailed program concerning the production of blaze holographic gratings with the help of the Fourier synthetic method is suggested. A description of the synthetic groove shapes is given and a comparison with the theoretical value is conducted. The calculation of the phase-shift of light waves under reflection is also given. Experimental equipment which is simple in construction, convenient in adjustment and highly precise is presented.

AUTHOR: LI Chunfei [2621 3196 7378]
JI Jiarong [1323 1367 6954]

ORG: Both of the Department of Physics, Harbin Institute of Technology

TITLE: "An Electrooptic Nonlinear Michelson Optical Bistable Device"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese No 4, 1981
pp 335-339

TEXT OF ENGLISH ABSTRACT: An electrooptical crystal was inserted in one of the two arms of a Michelson interferometer. The feedback signal was used for phase modulation of the light beam in this arm. Thus the light output intensity, as a result of the interference of two beams, exhibited optical bistability. An integrated optical device version based on this principle was proposed.

AUTHOR: FAN Junying [5400 0193 4481]
WU Cunkai [0702 1317 1956]
WANG Zhiying [3769 1807 5391]

ORG: All of the Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

TITLE: "High Efficiency and Diffraction-limited Dye Laser Beam Generated by Four-wave Mixing"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese No 4, 1981
pp 341-346

TEXT OF ENGLISH ABSTRACT: In this paper a way of generating a highly efficient and diffraction-limited dye laser beam is proposed. In this dye laser, Rhodamine 6G solution in alcohol is pumped by counterpropagating pumping beams in four-wave mixing. The 5320 Å laser radiation from second harmonic of the output of a Nd: laser system consisting of a Q-switched Nd:YAG oscillator and Nd:glass amplifiers is used as the pumping source. The Rhodamine 6G solution is used as both the active medium of the dye laser and the nonlinear medium for four-wave mixing. The concentration of the Rhodamine 6G solution in alcohol is about 5×10^{-5} mole. Using a pumping intensity of about 5×10^6 W/cm², the energy conversion efficiency of the pumping beam to dye laser beam is about 50 percent, and the beam divergence of the laser output is near diffraction-limited. The good quality of the output beam of the new type of dye laser is analyzed theoretically.

AUTHOR: CHENG Lu [4453 6424]

ORG: Department of Physics, Nankai University, Tianjin

TITLE: "The Holographic Information Capacity of Films in the Existence of Random Phase Fluctuations"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese No 4, 1981
pp 347-350

TEXT OF ENGLISH ABSTRACT: The effects due to random geometrical fluctuations of the surface of films and the random fluctuations of the index of refraction of the films are considered in the deduction of the holographic information capacity of films from the point of view of reconstructed three-dimensional images in the previous paper.

AUTHOR: JIN Feng [6855 6912]
LI Yushan [2621 3768 0810]

ORG: Both of Changchun Institute of Physics, Chinese Academy of Sciences

TITLE: "Two Polarization Measurements of Single-mode Waveguide Parameters"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese No 4, 1981
pp 351-356

TEXT OF ENGLISH ABSTRACT: A two polarization method for measuring single-mode waveguide parameters (thin film refractive index and thickness) was presented, the calculation formulas of single-mode waveguide parameters and the errors in parameter measurements were given, and single-mode glass waveguide parameters were measured. The measurement results showed that this method is simpler than multi-wavelength measurements, and the measurement accuracy is approaching that of multi-mode measurements of waveguide parameters.

AUTHOR: FAN Junqing [5400 0193 3237]

ORG: Changchun Institute of Physics, Chinese Academy of Sciences

TITLE: "The Eigen-mode Expansions of Dyadic Green's Functions for Dielectric Waveguides"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese No 4, 1981
pp 357-364

TEXT OF ENGLISH ABSTRACT: For dielectric waveguides of an arbitrary profile with step-index and gradient-index, the universal expressions of eigen-mode expansions of dyadic Green's functions for dielectric waveguides have been found by using the operator theory approach. It is shown that the expression of the electric-type dyadic Green's function is the sum of an eigen-mode expansion containing nine dyadic components and a singular term. From these expressions the dyadic Green's function for a dielectric waveguide can be obtained if the eigen-mode of the waveguide is given.

AUTHOR: CHEN Shuqin [7115 3219 3830]
ZHAO Jiran [6392 4949 3544]
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ORG: All of the Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

TITLE: "A Collinear CS₂ Picosecond Optical Grating"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese No 4, 1981
pp 365-369

TEXT OF ENGLISH ABSTRACT: A collinear arrangement of optical shutter with ultra-high time-resolution is introduced. An ultrashort pulse of Nd:glass laser is used as an ignition pulse and CS₂ liquid as Kerr medium. Correlation time of 15 picoseconds has been measured. We obtain values of the full width of half maximum of 1.06 μ ignition pulse and 5300 Å signal pulse as 12 picoseconds and 8 picoseconds respectively.

AUTHOR: SHA Cunxiao [3097 1317 1321]

ORG: Beijing Optical and Eyewear Industrial Corporation

TITLE: "An Approach to the Method of Vignetting Determination"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese No 4, 1981
pp 371-376

TEXT OF ENGLISH ABSTRACT: In this article a specific lens is taken as an example to approach the method of the determination of pupil shape, to stress under certain circumstances the existence of surplus inflection points and its cause using the prevalent cubic interpolating spline and, finally, to put forward two schemes subjected to tests for reference.

AUTHOR: LI Yuanheng [2621 0337 1854]

ORG: Institute of Mechanics, Chinese Academy of Sciences, Beijing

TITLE: "Dynamic Fabry-Perot Interference Effect of Parallel Plane Ge by Intense Laser"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese No 4, 1981
pp 377-378

TEXT OF ENGLISH ABSTRACT: Experiments show that transmittance of parallel-plane Ge changes quasi-periodically with time under CW CO₂ laser radiation. Based on multi-beam interference theory for parallel-plane and considering the influence of laser-induced temperature change on refractivity and thickness of Ge, the calculated results are consistent with the experimental data. This indicates that parallel-plane Ge has a dynamic Fabry-Perot interference effect on temperature, dependent on refractivity and thickness, by high power CW CO₂ laser heating.

AUTHOR: FAN Dianyuan [5400 3329 0337]

ORG: Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

TITLE: "Nonlinear Index in the Gain Medium"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese No 4, 1981
pp 379-383

TEXT OF ENGLISH ABSTRACT: The nonlinear index of refraction induced by stimulated transition of high level populations in the gain medium is investigated. Taking the example of active Nd:glass, we have specifically calculated the law of index changing with laser intensity. Several physical effects related to this nonlinearity, such as self-defocusing, self-modulation, nonlinear aberration and pulse distortion, etc., are indicated.

AUTHOR: DENG Ximing [6772 6932 6900]
LIN Weiping [2651 0251 1627]
FANG Honglie [2455 3163 3525]

ORG: All of the Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

TITLE: "Dynamic Analysis of Transmissions of Paraxial Light Beams"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese No 5, 1981
pp 385-394

TEXT OF ENGLISH ABSTRACT: In this paper the transmission of paraxial light beams was analyzed based on the gradient vector potential of electromagnetic field.

AUTHOR: FAN Dianyuan [5400 3329 0337]

ORG: Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

TITLE: "Optical Transfer Function in Terms of Ray Matrix Elements"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese No 5, 1981
pp 395-400

TEXT OF ENGLISH ABSTRACT: Starting from the diffraction integration in terms of ray matrix elements, the optical transfer functions have been derived for a complicated optical system. They are also represented by the ray matrix elements and have the following generality: All are permitted in the system in which there are complex lenslike media with quadratic index and gain (or loss) and Gaussian aperture (or Gaussian mirror) with Gaussian transmissivity (or reflectivity); the observation plane can be located at any plane; the location of the aperture can be arbitrary.

AUTHOR: David Casasent
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ORG: All of the Department of Electrical Engineering, Carnegie-Mellon University, Pittsburgh, Pennsylvania (including visiting scholars from the Institute of Optics and Electronics, Chinese Academy of Sciences, PRC)

TITLE: "A Laser Diode/HOE Pattern Recognition System"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in English No 5, 1981
pp 401-408

TEXT OF ENGLISH ABSTRACT: A compact and rugged optical correlator is described. It employs a lensless matched spatial filter that is formed at one wavelength. Correlation is performed with a laser diode at a second wavelength using an imaging lens in a scaling correlator topology.

AUTHOR: CHEN Yansong [7115 1484 2646]
JIANG Changshan [1203 7022 1472]
MING Hai [2494 3189]

ORG: CHEN and JIANG both of the Institute of Physics, Chinese Academy of Sciences, Beijing; MING of the Chinese University of Science and Technology, Hefei

TITLE: "Make Up Kinoform by the Method of Rotation Photograph"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese No 5, 1981
pp 411-414

TEXT OF ENGLISH ABSTRACT: A method of rotation photography was suggested in which the kinoform with axial rotating symmetry was made up and experimental results of the spherical kinoform were presented. The method reduces the noise caused by discrete phase on reconstructing the image. This method can apply to either spherical or aspherical kinds of kinoforms with axial rotating symmetry.

AUTHOR: WO Minzhen [3087 2404 2398]
WANG Nenghe [3769 5174 7729]
WANG Zhijiang [3769 0037 3068]

ORG: All of Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

TITLE: "Polarization and Interference in Michelson Interferometer Consisting of Two Corner Prisms"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese No 5, 1981
pp 415-422

TEXT OF ENGLISH ABSTRACT: The Jones 2×2 matrix of the corner prisms is found. Various forms of the Michelson interferometer consisting of two corners are discussed. In the case of the beam in one arm passing through the edge of a corner and the beam in another arm not passing through any edges of another corner, the interferometric field is divided into two parts. The phase difference between these two parts is $\pi/2$ and the fringe contrast in the whole field is over 90 percent.

AUTHOR: DING Peizhu [0002 1014 2691]
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ORG: Both of the Institute of Atomic and Molecular Physics, Jilin University, Changchun

TITLE: "The Abel Transformation of Mach-Zehnder Interferogram Analysis Supersonic Encircling Flow"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese No 5, 1981
pp 423-432

TEXT OF ENGLISH ABSTRACT: This paper deals with the Abel transformation of Mach-Zehnder interferogram analysis of supersonic airflow about cylindrical or spherical symmetric projectiles containing shock waves. We have investigated some properties of the solution with finite discontinuous points of the first kind for general Abel's integral equation. Applied to the Abel transformation between interference fringe shift $\delta(x)$ and density $\rho(r)$ in Mach-Zehnder interferogram, three conclusions having clear physical meaning are obtained: 1. interference fringe shift $\delta(x)$ laying in a straight line perpendicular to the symmetric axis of the interferogram of the flow field is a continuous function of x ; 2. $\delta'(x) \sim L/\sqrt{c-x}$ at $x \rightarrow c^-$, if the circle $r = c$, which is in the section I-I, is the shock wave; 3. if the interference fringe shift $\delta(x)$ is smooth except for one sharp point c and limit $\lim_{x \rightarrow c} \delta'(x)$ exists and $\delta'(x) \sim L/\sqrt{c-x}$ at $x \rightarrow c^-$, the shock wave appears at circle

[Continuation of GUANGXUE XUEBAO No 5, 1981 pp 423-432]

$\lambda = c$ in the section in the flow field, the density jump quantity at the shock wave $\Delta\rho = \lambda * L / K \sqrt{2c}$ and the transformation from $\delta(x)$ to $\rho(\lambda)$ is the usual Abel transformation for $\lambda \geq c$ and for $\lambda < c$. Therefore, we present a simple and accurate method of numerical calculation. This method is used for the calculation of $\rho(\lambda)$ from $\delta(x)$ and the calculation of the density jump quantity at shock wave.

AUTHOR: SHI Guanghui [0670 0342 6540]

ORG: Changchun Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

TITLE: "Correction of Secondary Spectrum with Intrinsic Chromatic Aberration"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese No 5, 1981 pp 433-439

TEXT OF ENGLISH ABSTRACT: An achromatic lens system may consist of several cemented or separated groups of crown and flint glasses. If there is a value of chromatic aberration in each group and a certain relationship between the positive or negative sign of chromatic aberration and the selection of glasses, the secondary spectrum of the whole lens system can be reduced to any small value. According to this principle, two complicated triplets with secondary spectrum corrected are given as an example. Their focal lengths are 1.5 m, F numbers are 7, and field angles are 15° and 18° respectively. Entirely common glass is used in one of the lenses.

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LI Qun [4539 5028]
HUI Lingkai [1920 0109 0418]
et al.

ORG: All of Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

TITLE: "Tunable Synchronously Pumped Ultrashort Pulsed Double-beam Lasers"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese No 5, 1981
pp 441-444

TEXT OF ENGLISH ABSTRACT: This paper reports the experimental results of the ultrashort pulses from two tunable dye lasers, which are synchronously pumped by the second harmonic of an active-passive mode-locked Nd:phosphate glass laser.

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ORG: All of Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

TITLE: "Study of Performance for Discharge Excited N_2^+ Laser"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese No 5, 1981
pp 445-449

TEXT OF ENGLISH ABSTRACT: The experimental results for the N_2^+ laser are presented. the measured optimum partial pressure of N_2^+ was 2.4 torr at a total pressure of 2 atm in He/ N_2 mixture. Kinetics of formation and quenching are analyzed and discussed. The spectra of the N_2^+ laser at 427.8 nm were determined with the second order spectra of a two-meter grating spectrometer. We observed that the 427.8 nm line is a doublet.

AUTHOR: LI Shiyong [2621 1102 5391]
CHEN Shaohe [7115 4801 0735]
XIE Ziming [6200 2737 6900]

ORG: All of Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

TITLE: "A Transient Acousto-optically Mode-locked Nd:YAG Laser"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese No 5, 1981
pp 451-456

TEXT OF ENGLISH ABSTRACT: An acousto-optically mode-locked Nd:YAG laser, pre-lasered with an electro-optic Q-switch, energy storage amplified, and modulated with an acousto-optic modulator operated at 50 MHz, is described. In the case of embedding a dye-cell into the cavity, the mode-locked laser can be operated either actively or passively. The performance of this laser is as follows: the pulse width varies continuously from 20 ps to several ns, energy of a single pulse is greater than 0.1 mJ, and the amplitude stability of the pulse train is better than 90 percent.

AUTHOR: WANG Wengui [3769 2429 2710]

ORG: Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

TITLE: "Model JQY-300 Laser Holographic Interferometer"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese No 5, 1981
pp 457-462

TEXT OF ENGLISH ABSTRACT: The model JQY-300 laser holographic interferometer is an instrument used for uniformity measurement of large pieces of optical glass by means of double-exposure holographic differential interferometry. The measurement accuracy of $\pm 5 \times 10^{-7}$ can be obtained.

The characteristics of structure design are as follows:

1. Foamed rubber is used as vibration-proof leading to a simple construction, and 8~9 Hz vibration can be isolated.
2. The optical path difference introduced by work-table deformation under heavy sample is eliminated using the method of placing the sample holder at the support point.
3. The sample mount consists of a three-dimensional angle micro-adjust structure instead of the commonly-used "point, line, plane" positioning structure. It is convenient for machining, assembly and the accuracy requirements can be met.

AUTHOR: LING Dehong [5677 1795 3163]
ZHANG Chenghua [1728 3397 5478]
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ORG: All of the Laser Research Section, Jiangsu Teachers College, Suzhou

TITLE: "The Experiments of Word Translation with Fourier Hologram"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese No 5, 1981
pp 463-468

TEXT OF ENGLISH ABSTRACT: A Fourier hologram with informations in the reference beam can be used as a holographic translator. The analysis made is based on the reciprocity of object beam with reference beam and experimental results are presented in this paper. The effect has been improved through the spatial amplitude modulation.

AUTHOR: SONG Weiguang [1345 4850 0342]
CHENG Zhongren [2052 1813 0088]
LI Ce [2621 2047]

ORG: All of Tianjin Laser Technique Institute

TITLE: "Memory Limit of Point Holographic Images"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese No 5, 1981
pp 469-474

TEXT OF ENGLISH ABSTRACT: It is expected that, on the Fourier-transform plane of objective lens, the point holographic image formed by object beam and reference beam is capable of higher memory density of Chinese characters and other foreign letters. Therefore, the memory limit which is related to the relative aperture F of the objective lens, the wavelength of the illustrating light and the number of terms of frequency and spectrum in the image are discussed. All of these have been identified by our experiments.

AUTHOR: ZHU Jibin [4376 4949 1755]
HU Xin [5170 9515]

ORG: Both of Hanjiang Institute of Precision Machine Tools, Hanzhong

TITLE: "Pulsed Mode and Differential Mode Zero-setting Gratings"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese No 5, 1981
pp 475-479

TEXT OF ENGLISH ABSTRACT: The description of existing pulsed mode zero-setting gratings in connection with their imperfections in the theory relevant to the locating accuracy is given. At the same time, a new type of zero-setting gratings, namely, of the differential mode zero-setting gratings, is suggested in this paper.

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CSO: 4009/141

Petroleum

AUTHOR: ZHU Lianfang [2612 5571 5364]
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TITLE: "Sedimentary Facies and Oil Possibilities of the Lower Cretaceous in the Western Part of the Jiuquan Basin"

SOURCE: Beijing SHIYOU XUEBAO [ACTA PETROLEI SINICA] in Chinese Vol 2 No 4, 1981 pp 11-22

TEXT OF ENGLISH ABSTRACT: Based on analyses of the characteristics of the cumulative probability curve of particle size and of the depositional characteristics (including lithology, fabrics and paleontology), the sandstone bodies of Lower Cretaceous in the western Jiuquan Basin are divided into 13 genetic types in 5 depositional systems: the diluvial fan deposits, the fluvial deposits, the deltaic deposits, the littoral deposits and the turbidites. Differences of sandstone bodies deposited under varying environments are described.

Study of the evolution of the sedimentary facies in early Cretaceous in the basin suggests that it underwent expansion and contraction of the water body twice during the period, resulting in the widespread water encroachment in the early part and the reduced scope of encroachment in the later part. The former was favorable for oil generation and the latter for sandstone reservoir formation.

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et al.

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TITLE: "Turbidites in the Third Member of Shahejie Formation of the Depression in the Western Part of Liaohe Basin"

SOURCE: Beijing SHIYOU XUEBAO [ACTA PETROLEI SINICA] in Chinese Vol 2 No 4, 1981 pp 23-30

TEXT OF ENGLISH ABSTRACT: The Liaohe Basin is a down-faulted basin of the rift valley type. In the course of development of the rift valley when rapid sinking of the basin and intensive uplifting of the surrounding mountains occurred, weathered materials from the denudated areas poured directly into the deep lake basin along the slope as turbulent flow deposits that formed turbidites as have been identified through studies of paleoecology, structural sequence, grain size combination and petrography.

The turbidites consist of two EW trending systems controlled by the source of materials supply on the two sides. They may be classified into fault-trough type, fault-valley type and canyon type, distributed in three main zones of slump facies,

[Continuation of SHIYOU XUEBAO Vol 2 No 4, 1981 pp 23-30]

proximal facies and distal facies. The principal oil bearing zones are at the junction of the slump and proximal facies zones and in most parts of the proximal and distal facies zones. In the vertical section, the reservoirs are chiefly in the middle and upper parts of the sandstone formation. As the reservoirs are at places enclosed by source rocks with abundant oil supply, they may be highly prolific locally.

Judging from the trend of turbidite development, we may expect to find oil pools to the south of Huanxiling, Shuangtaiz and Qingshui, etc.

AUTHOR: ZHANG Zhencai [1728 2182 2088]
CHEN Xianzhong [7115 3759 1813]
ZENG Xianzhang [2582 2009 4545]

ORG: All of the Exploration and Development Research Institute, North China Oil Field

TITLE: "Sterane and Terpane in the Crude Oil and Source Rock of the Beijing and Tianjin Region"

SOURCE: Beijing SHIYOU XUEBAO [ACTA PETROLEI SINICA] in Chinese Vol 2 No 4, 1981 pp 31-37

TEXT OF ENGLISH ABSTRACT: Based on the study of the chromatogram of terpane m/e 191 fragment, the five types of crude oil from the Beijing and Tianjin region are divided into two groups, one with abundant terpane and the other with only a small amount of terpane. It is believed that the oil in the third member of the Shahejie Formation (Es_3) comes primarily from the Es_3 source rock, and the crude oil in the fourth member of Shahejie (Es_4)-Kongdian Formation and the buried hill comes from Es_4 -Kongdian source rock.

By using the parameters of sterane isomers, five sources are determined for the crude oil of the region, among which four are of a single origin and one is of mixed origin.

AUTHOR: CHEN Zhongxiang [7115 6945 4382]
CHEN Yuguo [7115 0060 2654]

ORG: Both of the Scientific Research Institute for Petroleum Exploration and Development, Beijing

TITLE: "Fluid Displacement in a Medium with Double-porosity in the Gravitational Field"

SOURCE: Beijing SHIYOU XUEBAO [ACTA PETROLEI SINICA] in Chinese Vol 2 No 4, 1981 pp 39-50

TEXT OF ENGLISH ABSTRACT: The theory of fluid displacement in a medium with double-porosity has been generalized to include the effects of gravity. Various situations of fluid displacement in the gravitational field are thoroughly investigated, thereby giving a theoretical basis for efficient production of oil from carbonate reservoirs with bottom water.

AUTHOR: BAI Songzhang [2672 2646 4545]

ORG: Exploration and Development Research Institute, North China Oil Field

TITLE: "Mechanism of Water Drive in Carbonate Pools with Bottom Water Relative to the Rule of Its Movement"

SOURCE: Beijing SHIYOU XUEBAO [ACTA PETROLEI SINICA] in Chinese Vol 2 No 4, 1981 pp 51-61

TEXT OF ENGLISH ABSTRACT: The development of the massive carbonate reservoir with bottom water in the Wumishan Formation in the Renqiu Oil Field reveals that for the successful development of an oil field of this type, it is imperative to study the mechanism of displacement of oil by water together with the rule of bottom water movement on the basis of oil field geology.

Combining theory with practice and summarizing the data of oil field development and the results of simulation tests, the author examines the dynamics of water drive in carbonate reservoirs with dual porous media as well as the rule of bottom water movement and proposes a number of measures for tackling some of the basic problems relating to the improvement of oil field development.

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CSO: 4009/151

Seismology

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ORG: FENG, CHEN, and HE, et al., all of the Institute of Geophysics, State Seismological Bureau ; ZHU of Chengdu Geological College; DING of the Seismological Bureau of Shanxi Province; SUN of the Institute of Geophysics, Chinese Academy of Sciences

TITLE: "Crustal Structure in China from Surface Waves"

SOURCE: Beijing DIZHEN XUEBAO [ACTA SEISMOLOGICA SINICA] in Chinese Vol 3 No 4, Nov 81 pp 335-350

TEXT OF ENGLISH ABSTRACT: In this paper, numerical inversion from surface wave dispersion gives the layered structures for some regions in China.

The results of this work show that the crust in China can be divided into five continental major blocks: Tibetan Plateau, Mongolian Plateau, North China, South China and Tarim Basin. In general, there are three layers (sediments, granitic

[Continuation of DIZHEN XUEBAO Vol 3 No 4, Nov 81 pp 335-350]

and basaltic layers) in the crust. The seismic wave velocities in the upper mantle and basaltic layer for the latter four regions are almost the same. The average velocities in Tibet and in North China are lower than in the other regions and the lateral heterogeneity is quite obvious. The Conrad interface is not a steady and sharp discontinuity. In some parts low velocity layers do exist, and the high seismicity in these two regions is directly related to the deep crustal structure. The crusts of the other three regions show some characteristics of stable platform. The coastal crust can be divided into two regions by the mouth of the Changjiang River, belonging to the crusts of North and South China respectively.

The crustal thicknesses in China are 32-40 km for East China, 60-70 km for Tibet. The thickest sedimentary layer is found in the Tarim Basin amounting to about 11 km, but for other regions it is generally 3-8 km.

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LIN Weifan [2651 0251 0416]
JIANG Ming [5592 6900]
LI Geping [2621 2706 1627]

ORG: YANG of Beijing University; LIN, JIANG and LI all of the State Seismological Bureau

TITLE: "Recent Tectonic Movement of the Babaoshan Fault near Beijing and Its Relation to Earthquake Occurrences"

SOURCE: Beijing DIZHEN XUEBAO [ACTA SEISMOLOGICA SINICA] in Chinese Vol 3 No 4, Nov 81 pp 390-398

TEXT OF ENGLISH ABSTRACT: Based on the geological framework, ground level deformation, underground water level changes and seismicity data, the character of the recent tectonic movement of the Babaoshan Fault has been investigated. It is shown that during the time period from 1972 to the Tangshan earthquake of July 1976, the type of tectonic movement of this fault was different for different intervals of time. Before September 1973, it was tensional and right lateral; after that time the movement became compressional and left lateral, and until the Tangshan earthquake there was accelerated movement along that fault for a short duration accompanied by variations of underground water level, starting from the southern portion toward the north in three deep wells drilled into bedrock on the western side of the fault.

[Continuation of DIZHEN XUEBAO Vol 3 No 4, Nov 81 pp 390-398]

In June 1973, the water level began to rise first in the Xiexigang well to the south, and then in July and October the water levels in the Dahuichang well and the Banqiao well to the north rose respectively. On the other hand, from April to July of 1975, obvious lowering of the water level was observed in the wells. First, the water level in the Xiexigang well began to descend in April and then that of the Dahuichang well and the Banqiao well also lowered in May and July respectively.

It was noted that while the water level of the Dahuichang well was lowering, there was also ground level deformation around that well.

All such phenomena may be explained as the effect of the creep of the Babaoshan Fault which was transmitting from the southwest to the northeast gradually. For more than 10 years, a small earthquake in the vicinity of the fault was concentrated in a zone to the northwest of this fault and to the southwest of the northwest-trending Nankou-Sunhe Fault. It might be explained as the result of the barrier effect of the latter to the northeasterly creep movement of the Babaoshan Fault.

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ORG: Both of the Institute of Biophysics, Chinese Academy of Sciences

TITLE: "A Study of the Relation between Acoustic Emission and Unusual Animal Behavior Prior to Earthquakes"

SOURCE: Beijing DIZHEN XUEBAO [ACTA SEISMOLOGICA SINICA] in Chinese Vol 3 No 4, Nov 81 pp 429-439

TEXT OF ENGLISH ABSTRACT: This paper is an analysis of some observed results of acoustic emission prior to earthquakes occurring in the last 10 years in China for the temporal and space distribution pattern of such acoustic emissions before large earthquake events and an estimation of the transmitted sound pressure above the bed rock and in surface water. The distribution pattern was then compared with that of unusual animal behaviors before earthquakes. In addition, the threshold values of sensation to hearing and vibration of humans and some animals have also been compared. Finally, a cross-correlation analysis of the observed acoustic emission and the activities of fish during the aftershock of the Tangshan earthquake for the same time intervals was made. The results are as follows:

1. The pattern of temporal and space distribution of acoustic emission and anomalous animal behavior before earthquakes are generally similar. They are commonly referred to as the earthquake short-term precursors.

[Continuation of DIZHEN XUEBAO Vol 3 No 4, Nov 81 pp 429-439]

2. Transmitted sound pressure of acoustic emission before an earthquake of the magnitude around 3 near the epicentral region above the bed rock and in the surface water equals respectively 23-19 dB and 90-86 dB in the frequency band of 150-250 Hz. It can be seen that human ears are not able to sense this sound pressure level on the ground surface, but possibly cats, dogs and pheasants on the ground surface and usually rats living in holes can sense it, and perhaps teleost fish are superior to ground animals in sensing acoustic emission prior to earthquakes. At the same time, the vertical amplitude of displacement of the bed rock surface amounts to about 10^{-7} cm. Although this value is about three orders of magnitude lower than the amplitude thresholds of sensation to vibration for some animals, we might infer that the vertical amplitude of ground surface displacement before strong earthquakes can be of the order of microns or more, so that they should be able to sense the vibrations.

3. When the observational sites for the activities of fish and acoustic emission are about 20 m apart, the results show that they reflect not only the aftershock activity of the same regions in Tangshan, but also certain cross-correlations between the sequences of daily frequency of activities of fish and acoustic emission.

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CSO: 4009/153

Textile Research

AUTHOR: None

ORG: None

TITLE: "Provincial Chemical Fiber Technology Specialty Conference Held in Sichuan"

SOURCE: Shanghai FANGZHI XUEBAO [JOURNAL OF TEXTILE RESEARCH] in Chinese No 5, 81
p 56

ABSTRACT: Sichuan Province and Chongqing City Textile Engineering Society Chemical Fiber Specialty Committee held a 1980 Chemical Fiber Annual Conference on 20-28 Mar 81 at the Sichuan Vinyon-fiber Plant. Participants included 44 delegates representing ten plus provincial, municipal, commercial, manufacturing, educational, and research organizations. Some members of the plant attended as nonvoting participants. The conference received 31 papers, 12 of which were exchanged during the meetings. The Chairman, Prof. LI Shengping [2621 0581 1627] of Chengdu University of Science and Technology reported on new developments in chemical fibers and the modification of vinyon fibers. WANG Dapeng [3769 1129 7720] of the plant introduced impressions of his observation trip in Japan. The spirit of democracy was maintained throughout the conference. The participants expressed their opinions freely, summarized their own experiences, and exchanged with others. Finally, it was resolved that the 1981 Annual Province-wide Conference of Chemical Fiber Technology will be held in Mar 82 in Chengdu and the discussion will emphasize ways of reducing the cost and improving the quality of chemical fibers.

AUTHOR: TANG Wenhui [0781 2429 6540]

ORG: None

TITLE: "Certification of the YJ1A-120 Drawing and Roving Machine"

SOURCE: Shanghai FANGZHI XUEBAO [JOURNAL OF TEXTILE RESEARCH] in Chinese No 5, 81
p 12

ABSTRACT: For the purpose of improving the quality of drawing rollers, the Bureau of Machines of the Ministry of Textiles resolved in 1978 to design a new series of drawing machines. With the bureau in charge of the project, the designing work of the YJ1 series was performed by Changde Textile Machinery Plant, and the YJ1-120 fine cotton yarn drawing machine was experimentally made by the Shanghai Textile Machinery Plant No 3. In order to facilitate future reconstruction of the old machines, Shanghai Textile Machinery Plants No 3 and No 2 decided to work jointly in designing the YJ1A-120 which is a combination drawing and roving machine, which is purposefully made to feed the A513 fine cotton yarn spinning frame. On 2 Jul 81, the Shanghai Bureau of Textile Industry was requested by the ministry to call a certification meeting at the Shanghai Cotton Plant No 5 to appraise the finished product. The meeting was attended by 40+ delegates of related organizations. Following various tests, the machine was found to meet the quality requirements of pure or mixed cotton yarn of less than 35mm. After several existing problems are resolved [the paper gives no details about these problems], the delegates agreed, the machine may proceed to the intermediate test production stage.

Total Quality Control

AUTHOR: YANG Jinting [2799 6855 1656]

ORG: None

TITLE: "Preliminary Success of Promoting TQC [Total Quality Control] in Hunan Province"

SOURCE: Beijing ZHILIANG GUANLI [QUALITY CONTROL] in Chinese No 5, 29 Oct 81 p 16

ABSTRACT: In the 2 years following the extension of TQC in Hunan Province, some improvements have definitely been gained. The indications are as follows: (1) Gradual extension of TQC education: To date, 16 classes sponsored by the Provincial Economic Committee and various special bureaus have trained 1600 persons and 22 percent of the province's 3.2 thousand workers have received some form of TQC education. (2) Industries gained TQC experience: The province has established TQC test points in 284 enterprises (12.5 percent) to carry out strict systems of responsibility, accounting, awards and penalties and the quality of products has been continuously improving. (3) QC teams organized by the masses: The province now has 2967 QC teams. At the conference of representatives of these teams last year, 94 items of achievements were announced and of these 58 items resulted in reduction of waste to save the state 4.05 million yuan. (4) The quality of products has improved: According to statistics of the 7 bureaus of metallurgy, machinery, chemical engineering, light industry, transportation, coal, and construction materials, of the 186 products rated the quality of 169 (91 percent) showed an improvement over the quality of products made in 1979. Outstanding problems in TQC management are briefly mentioned.

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CSO: 4009/143

Vacuum Technology

AUTHOR: SUN Zhimin [1327 3112 3046]

ORG: Jinzhou Vacuum Instrument Plant

TITLE: "The KLD-500 Hollow Cathode Ion Coating Machine Certification Conference Held Jointly by Jinzhou Vacuum Instrument Plant and the Research Institute of Metals Chinese Academy of Sciences in Shenyang"

SOURCE: Shenyang ZHENKONG [VACUUM] in Chinese No 5, 25 Oct 81 p 72

ABSTRACT: Hollow cathode ion coating is a new ion coating technique developed in the 70's. The vacuum requirement is low, the equipment is simple, the work is safe, and it does not pollute the environment. Abroad, the technique is being applied to deposit a film of Cu, Ag, quartz, Cr, CrN, CrC, TiN, TiC, etc. Industrial equipment of this technique has been in operation in Japan. In China, its research began in Apr 80, carried out jointly by Jinzhou Vacuum Instrument Plant and Research Institute of Metals Chinese Academy of Sciences. Design and manufacture of the KLD-500 hollow cathode ion film coating machine were completed in Mar 81. In half of a year's test operation, the institute (in Shenyang) succeeded in using the machine to coat a layer of imitation metallic titanium nitride on stainless steel, and produced a big batch of imitation metal watch cases for the market place. On 2-3 Sep 81, a conference was held in Shenyang to appraise the machine. Delegates at the conference agreed that the machine is a success and the technique mature, and approved its gradual experimental production to meet urgent needs of the country. Jinzhou Vacuum Instrument Plant has begun to prepare for its production in small batches.

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ORG: None

TITLE: "China Vacuum Society Technique of Achieving Vacuum Specialty Committee Established in Shenyang and Held Its First Scientific Conference"

SOURCE: Shenyang ZHENKONG [VACUUM] in Chinese No 5, 25 Oct 81 inside back cover

ABSTRACT: The conference for the establishment of the China Vacuum Society Technique of Achieving Vacuum Specialty Committee and its first scientific conference was held on 10-14 Sep 81 in Shenyang. Delegates representing 9 provinces (cities), 13 systems, and 46 research units, schools of higher education, and industries attended. This has been the great meeting of specialists of the field of vacuum, following the conference for establishing the Vacuum Metallurgy Specialty Committee and the Application of Vacuum in Electronic Devices Specialty Committee of the society. This conference received 66 papers, reviewing the various achievements in vacuum technology in China since the establishment of the China Vacuum Society in 1979. Scientific activity plans for 1982 and 1983 were discussed and formulated, along with a general examination of trends of development of techniques for achieving vacuum.

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Dec. 28, 1981